OIL & FAT INDUSTRIES

The Editor's Page

The Outlook for 1929

THE oil and fat producers and refiners of this country have passed through many trying periods since the times of plenty which marked the world war period. If there is any known form of business ailment through which the industry has failed to pass, it is only because the many ills have left no room for another. Over-expansion, over-purchasing, too low a tariff, too high a tariff or no tariff at all, over-production or under-production by growers of our raw material, high seed prices, low seed prices and so on, have been the cry on every hand, until it apparently became impossible for anyone to determine what it was all about.

But out of all this confusion, it has finally become apparent in the industry that what the producers and refiners of oils and fats need most is *a definite policy*. That policy should be: "To produce only products of the highest quality at the lowest possible production costs and to market those products at prices which are fair, not only to the public, but to the seller, and to *competitors*, in order that the industry as a whole need not suffer the evil effects of price-wars, or of low quality merchandise foisted on the public by any single production unit."

During the year just ended, this industry has made considerable progress toward the attainment of this ideal, and as a consequence, most of the businesses concerned have been able to report a successful year. The most important event of the year was the adoption of a Code of Ethics and Trade Practice by the Interstate Cottonseed Crushers Association and by its newly rejuvenated Shortening and Oil Division. In summary, this code may be viewed as an exposition of the simple truth that the best business doctrine is "*Live and let Live.*" The cottonseed mills have determined to try the experiment of paying only such prices for seed as will enable them to make a manufacturing profit out of their production of oil and cake, and the refiners are likewise determined to sell finished oil, shortening and other products, only at such prices and on such terms as will enable them to live. On this basis, the coming year should be more successful than last.

This new year brings to the Cottonseed Crushers their biggest opportunity. If they really desire to make their Association a national, rather than a sectional body, now is the time to act. The problems and interests of the linseed miller, the copra miller in this country, the corn oil miller, and the American soya bean miller are identical with those of the cottonseed miller. All of these manufacturers will gladly join with the Cottonseed Crushers' Association if shown that the latter truly desires to make its body a strong national force for the advancement of American oil industries as a whole.

The outlook for 1929 is good. Do your share in making it good. As the industry as a whole improves, so will your business.

Government and Definitions

ELSEWHERE in this issue will be found news of the establishment of a standard for mayonnaise by the U. S. Department of Agriculture. Before the issue of this standard and definition, the Department was called upon to consider seriously proposed claims that the right to use the word "mayonnaise" should be denied to all manufacturers who used any oil in their product other than olive oil. This brings to our mind the question, "To what lengths will our Government go in parcelling out the dictionary among its citizens?" and perhaps an even more relevant question, "In what article of our much-abused Constitution is the title and power of dictionary-interpreter conferred upon the Government, and upon what branch, the Executive, the Legislative, or the Judiciary?"

The word "mayonnaise" is a typical French word, adopted bodily into the English language for the purpose of defining a firm mixture of edible oil and egg or egg-yolk, used as an appetizer or relish with salads or sandwiches. No American has ever attempted to make the word imply or infer that one particular kind of edible oil must be used in the preparation of the product. We venture to say that even in France, the home of the word,

(*Turn to Page* 33)

THE INDUSTRY IMPROVES

By A. W. Putland
President, American Oil Chemists' Society

AMERICAN manufacturers of oils and fats and their products and of soap can look back upon 1928 as a year of definite achievement and progress toward stabilization of their industries.

One of the most important developments of the year was the adoption by the cottonseed crushers and refiners of a Code of Ethics and Trade Practices, as suggested at a series of conferences with representatives of the Federal Trade Commission. Adherence to this code by the oil millers and refiners will inevitably bring about recognition of this great industry as an efficient and important factor in America's leadership of the world's industry.

The past year has been generally profitable for all branches of the oil and fat industries and has been marked particularly by several sensational developments in the way of mergers which have strengthened the positions of companies already well intrenched.

One company, which, although it was the outgrowth of one of the oldest edible oil manufacturers, entered the year primarily as a soap manufacturer; has distinguished itself by the purchase of one of the largest edible oil specialty producers and by also entering several allied edible product fields, and bids fair to re-establish itself among the leaders in those branches.

At the same time, one of the oldest linseed oil producers had disposed of its properties, dividing them among its two principal competitors, thus greatly improving the position of the latter in the market.

Another younger linseed oil factor has signalized his initial success by the purchase for operation of one of the country's oldest established linseed oil businesses, which had been dormant several years.

In the soap field there has been great activity, and the volume of fats and oils consumed in soap production for domestic use and for export has been larger during the past year than ever before in the history of this country.

What of the oil chemist and the part he has taken in the development of these great industries?

It is with justifiable pride that we can say that the success of this country's oil production and refining and soap-making has been and is dependent in large measure upon the manufacturing economies effected by chemists and chemical engineers.

During the year just past, your Society has continued its healthy growth and has taken steps to insure an even greater future.

The annual meeting in New Orleans in May was well attended and was marked by the presentation of many splendid contributions to our general scientific knowledge.

The work of standardizing color reading methods which has been prosecuted so faithfully by the Bureau of Standards has borne much fruit in the past year.

In the course of the year, arrangements have been completed for the publication of the Society's Official Methods of Analysis, including the Methods of the Joint Fat Analysis Committee of your Society and the American Chemical Society. The Methods will be published in loose-leaf data sheet form for insertion in a standard ring-type binder. The data sheets and binders will be obtainable from the Secretary of the Society and by special arrangement with the publisher all changes will be promptly incorporated in new sheets, enabling every oil and soap chemist to keep his manual of analytical methods up to date at all times.

The Second Fall meeting of the Society, held in New York in October, and devoted chiefly to the interests of soap chemists, was a signal success, resulting in the formation of a Soap Chemists' Section of the Society. A. K. Church of Lever Brothers, Cambridge, Mass. was elected Chairman of the Soap Chemists' Section.

Our Official Journal, *Oil & Fat Industries*, has progressed with the Society during the year and we have every reason to expect that it will be of even greater service to us in the future.

The magazine *Soap* has been designated as Official Organ of the Soap Section and will publish papers and news of special interest to the Section.

Having thus completed a successful year, our Society enters the New Year facing the greatest opportunity in its history.

Our appeal has become National, rather than sectional, and there is real profit to be derived from membership in our Society by every

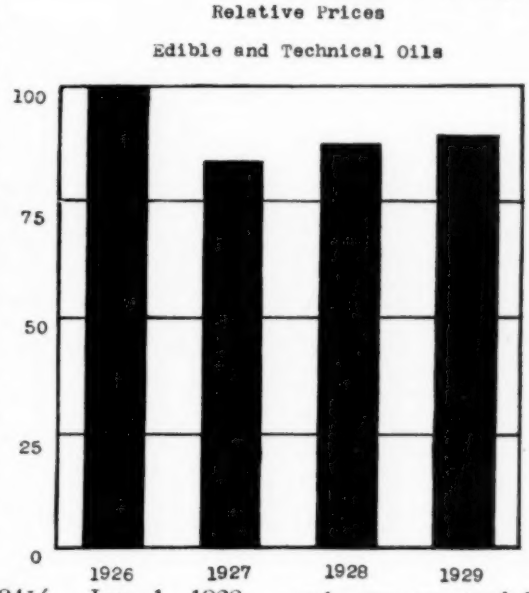
(*Turn to Page* 33)

A Review of the Fat and Oil Markets

Improvements in Sales and Prices in 1928 Brought More Stable Conditions and Better Outlook for 1929

PRODUCERS and refiners of fats, oils and greases enjoyed a generally good year in 1928—a better year than either of the preceding two. It has been an uphill fight for the technical and edible oil interests ever since the drop in prices which came in late 1926 as a final anti-climax after the post-war deflation. Since that time, prices have been slowly climbing back to their former levels and the industry has been struggling for profits long overdue.

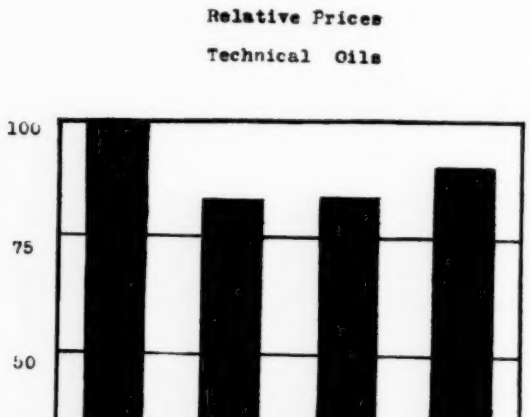
The chart showing relative prices of technical and edible oils was constructed by taking fifteen representative fats, oils and greases, weighting them in accordance with their importance to producers and refiners, and then comparing the relative group values at intervals of a year. Jan. 1, 1926, was taken as a base point and the value of the fifteen oils at that date was taken as 100. By Jan. 1, 1927, the slump, noted above, had been felt at its worst, and the relative value of the fifteen items had declined to 84½. Jan. 1, 1928, showed a price gain over the previous year, with an index reading of 88. Jan. 1, 1929, reveals a continuance of the upward movement, with the index of prices rising 1½ points to 89½. In general, fats and oil are now priced at 89½% of their Jan. 1, 1926, values.



In attempting to analyze further the price trend, the accompanying master chart was broken down into two subsidiary charts, one of which shows technical oils, and the other, edible oils. Eleven representative weighted oils and fats were used in making up the technical oil chart. These were Manila nut oil, yellow grease, linseed oil, lard oil, menhaden oil, olive oil foots, palm kernel oil, Niger palm oil, red oil, stearic acid and tallow. The relative value of this group of oils declined from a base value of 100 on Jan. 1, 1926, to 83 on Jan. 1, 1927. Little change in the value of the oils as a group occurred during the following year, and the index for Jan. 1, 1928, was only a shade above 83. In the past year the prices of various oils, notably, linseed oil, stearic acid, palm oil and olive oil foots, have advanced materially, and the group reached an index value of 90 on Jan. 1, 1929. With rising prices and a good volume of business, dealers in technical oils enjoyed a satisfactory year, and report larger profits.

Manila coconut oil opened 1928 in a strong position due to short copra arrivals. Coast tanks were quoted at 8⅝c lb. in January, 1928, but soon declined to 8¼c on receipt of larger stocks. The decline continued during the summer months, the price reaching 7¾c in September. A recovery was noted in November on report of damage to the copra crop, and spot tanks closed the year at 8⅛c. Raw linseed oil opened the year in a weak position, being priced at 8¾c lb. in tanks. It rose quickly to 9c in February, and to 9⅜c in May. On June 1 it was high for the year at 9⅝c, but soon dropped off to 9⅛c in July. It was steady throughout the rest of the year, and closed at 9¼c.

Palm kernel oil held to a low price level all through 1928. It opened at 8⅝c lb., facing strong competition from other oils. Its low price attracted attention, and trading activity resulted. It varied from 8½c to 8¾c lb. for

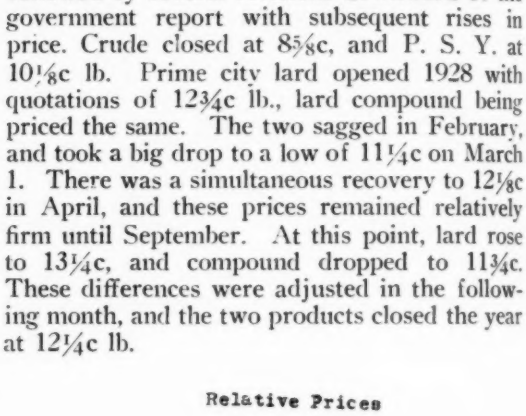


the first nine months of the year, and then declined to 8⅜c in October. At the close, it was back at 8½c lb.

Tallow opened 1928 in a strong position, with city extra quoted at 9⅛c lb. on shortage of supplies. Abnormally high levels were maintained all through the year. There was a break in the market in February, and a second drop in June, but at no time, did prices fall as low as 7½c to 8c, which has come to be accepted as normal for tallow. Strength was shown again in the closing months, a top of 9½c being reached in November. Late December quotations were 9c, slightly under the year's opening price.

PRICE movement among the edible oil products over the past four years has been a different story. Six oils and fats, edible coconut oil, cottonseed oil, palm kernel oil, lard, lard compound and peanut oil, properly weighted as to importance, were used in making up this index. Again using Jan. 1, 1926, as a base point, with a value of 100, it was found that edible oils did not decline as far as technical oils in the 1926 slump, going down only to 86 on Jan. 1, 1927, as compared with the 83 to which the technical oil index dropped. The recovery was also faster, and the index value mounted to 92 on Jan. 1, 1928, while technical oils were still stagnant at 83. The past year has seen a slight falling off in the value of the edible oil group, caused principally by declines in the price of lard, lard compound and coconut oil since Jan. 1, 1928. The index, as a result, has fallen off to 89, a three point drop, while the technical oil index has been rising from 83 to 90. Edible oil dealers did a good volume of business in 1928, but profited less because of falling prices.

The yearly record of the prices of coconut and palm kernel oils has been given under the discussion of the various technical oils. The price of crude peanut oil held firm at 12c lb. throughout the year. Cottonseed oil, opened the year at 8⅝c for crude and 10½c for P. S. Y. Weakness in hog products and large offerings of oil depressed prices in February to 7¾c for crude and 9¾c for P. S. Y. Unfavorable weather brought prices back up in May, crude reaching 8⅞c, and P. S. Y., 10¾c. The favorable government cotton crop prediction lowered prices sharply in August to 7¾c for crude and 9½c for P. S. Y. This was followed by several revisions downward of the government report with subsequent rises in price. Crude closed at 8⅝c, and P. S. Y. at 10⅛c lb. Prime city lard opened 1928 with quotations of 12¾c lb., lard compound being priced the same. The two sagged in February, and took a big drop to a low of 11¼c on March 1. There was a simultaneous recovery to 12⅛c in April, and these prices remained relatively firm until September. At this point, lard rose to 13¼c, and compound dropped to 11¾c. These differences were adjusted in the following month, and the two products closed the year at 12¼c lb.



Ask Increase in Oil and Fat Tariff

Dairy Industry Interests Assume Leadership in Movement to Advance Vegetable Oil Schedules

INCREASES in the tariff rates on various vegetable oils and fats were urged in a hearing on Jan. 9 before the Ways and Means Committee held in Washington. A list of vegetable oils was submitted on which duty increases up to 100 per cent were asked by producers and backed by the dairy and farm organizations. Strong protests againt any increase were presented by soap and laundry interests. The agricultural demands were submitted by Charles W. Holman of the National Cooperative Milk Producers' Federation, speaking for some of the largest farm organizations in the country.

The demand for increases brought opposition from laundry soap manufacturers and laundrymen, whose representatives declared the higher duties proposed by farm organizations would mean a 50 per cent increase in the price of soap and greater charges for laundry work. W. F. Fitch of La Salle, Ill., speaking for the Laundry Owners' National Association, said the proposed revision would increase the soap bill of the laundries from $30,000,000 to $45,000,000 a year, and that they would pass this on to the public. He estimated that the home laundry soap bill would be increased $135,000,000 a year, while the increased duties would not aid the farmer.

A suggestion by the farm interests for changing the free trade policy now practiced toward the Philippine Islands with respect to coconut and copra products brought opposition from Major Gen. Frank McIntyre, retired, former Chief of the Philippine Bureau in the War Department, who has just been appointed resident trade commissioner in Washington for the islands. He opposed any change in the Philippine tariff policy.

The rate the farm organizations want for oils in the chemical list is 45 per cent ad valorem and would apply to such oils as cotton seed, peanut, coconut, olive, soya bean, linseed, fish oils, poppyseed and various combinations and mixtures of animal, vegetable or mineral oils. The farm spokesman said similar increases will be proposed for oils and fats in other schedules, like lard and tallow, and urged the committee to consider all oils, fats and raw materials at the same time in working out the new tariff bill.

"In support of this proposed duty," he said, "we say frankly to the committee that our hope is that such an increase will raise the present domestic price level of the oils and fats in order that the domestic producers of raw materials may benefit from price increases."

"We believe that the time has arrived when there should be an additional tariff policy with respect to the future of the oils and fats industries of this nation. We believe that policy should be based upon the assumption that the domestic market is to be the dominant market both for the producers of the raw materials and the manufacturers of articles such as paint, varnish and soap."

Supporting in general the presentation for allied farm groups, Chester H. Gray, Washington representative of the American Farm Bureau Federation, said the farmers are looking at tariff matters differently from twenty-five years ago.

Replying to the farm groups, F. M. Barnes, chief of the purchasing division of the Procter & Gamble Company, speaking for the laundry soap manufacturers, declared that last year 900,000,000 pounds of fats were used in soap making in the United States and that the manufacturers were short then by 750,000,000 pounds of raw material, which had to come from the outside. The production of animal fats, he contended, is decreasing, while the soap business is increasing. The proposed 45 per cent ad valorem duty, he said, would mean an increase of 50 per cent in the price of soap. Mr. Barnes denied that the tariff increase on animal fats would help the farmers, explaining that little tallow is cut off in the packing houses.

Pumping, Piping and Heating

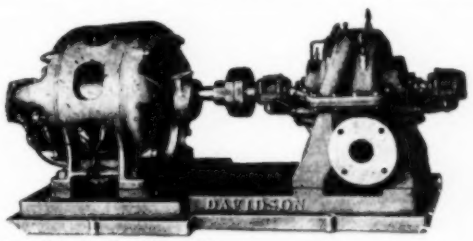
A Discussion of Equipment and Process Methods for the Average Fatty Oil Plant

By THOMAS ANDREWS

PIPE lines and pumps move our oil about to the destined points with a minimum of trouble and one of the most striking points of a big oilworks, running a large number of processes, is the number of and the varied types of pipelines that are encountered. To the casual visitor these pipelines are "just pipelines" and probably he never realizes that each has its own peculiar use which has to receive the careful attention of the designer and the maintenance engineer. In oil process work, the pipes may be made of any of the following materials each of which is indicated in special positions—steel, wrought iron, cast iron, lead, copper, brass, vitreous ware, and special alloys made to resist the action of some of the reagents used. Apart from the fact that it is often necessary to choose a special material for the pipes, it is often necessary to joint the pipes in some special manner and consequently, we have joints made by screwing, flanging, welding and brazing. Moreover there are plain pipes, lagged pipes, coil wrapped pipes and jacketed pipes—altogether a rather formidable list.

Through these pipes we pass oils, fats, fatty acids, glycerin, alkaline solutions, acid solutions, and solutions of the various salts in use some of which would soon destroy the metal if no care were exercised in its choice. Apart from these special process pipes there are, of course, the common works' pipes of which the steam, superheated steam, gas, water gas, ammonia, hydrogen, carbon dioxide, and water pipes are the most important. The greater part of the oils pass through ordinary screwed and socketed piping and, provided that it is properly supported, free to expand and not subject to shock, such as is introduced by heavy intermittent pumping or by a large number of sharp bends, it is surprising how little attention it requires. The loss of oil on a well erected screwed pipeline is practically nothing but even so it is surprising to find how often, through carelessness, there is a small drip of oil exuding from screwed joints. The money side of the loss is often trivial but oil has a habit of making a sticky deposit which is difficult to clean up. We often find that it does not get cleaned up with a consequent deterioration in the morale of the works.

Hard fats, the solid fatty acids, and the hydrogenated oils are passed through pipes jacketed for steam or hot water. These are generally made of cast iron, the ports for the jacket being cored through the flanges of the pipes. In erecting these pipes care should be taken that sections can be removed without disturbing the whole run. This often means that pipes of standard length cannot be used and consequently the first cost of the pipes is high. This higher cost often fades into insignificance



Courtesy M. T. Davidson Co.

Motor Driven Centrifugal Pump

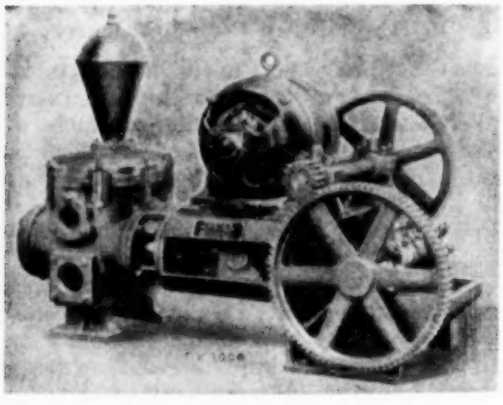
however, when a blockage in the jackets arises or when for any cause the pipes have to be taken down in sections. There are times when cast iron pipes cannot be used and steel pipes can. In these cases, it is not usual to jacket the pipes owing to the high cost. But the steel pipes are wrapped with a small pipe to carry the heating fluid.

Copper pipes of five-eighths inch bore are wrapped around the steel pipes, the steam circulating through the copper tubing. It is necessary to take drain tappings at frequent intervals to prevent water hammer or stoppage through condensation. In non-exposed places and in clean processes a length of ordinary one-half inch iron piping may be laid along the steel pipe and tightly bound to the pipe with a layer of metallic gauze. The whole is encased in lagging and on steam being passed through the small iron pipe, we have the same effect as in the coil wrapped pipe at a much

lower cost. By placing unions on the heating pipes to correspond with the joints in the heated pipes it is a simple matter to arrange to lift out sections without disturbing the whole. This is especially necessary in the case of lagged piping as it is then possible to remove the section without disturbing the lagging. High pressure steam, superheated steam, and high pressure gases are usually carried in welded steel piping:—alkaline solutions, salt solutions and water are carried in cast iron piping. Care must be taken in arranging these pipes to see that where they are used to carry hot solutions that are liable to deposit crystals on cooling there is a drain pipe fixed at the lowest point in the service to remove any solution left in the main and to see that there is a steam or air service fixed at the highest point so that any of the hot liquor lying in pockets can be blown out before it has time to crystallize. Acids are usually carried in lead pipes although where the lead salts are soluble some alloy must be used unless recourse be made to the use of vitreous ware. Brass pipes find their chief use in the condensers and to a less extent in the heating systems. Copper is used in the small mains, sometimes in the steam mains.

Pumps and Pumping

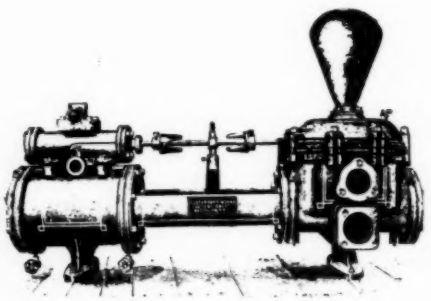
IF WE liken the pipelines to the veins of the oil body then we may refer to the pump system as the heart of the oil body as without the pumps, the greater part of our pipelines



Courtesy Foster Pump Works

Motor Driven Duplex Pump

would be dead. The oil world abounds in pumps that have been designed to carry out many different jobs in pumping. Apart from the hydraulic pumps, we find feed, general purpose, positive rotary, centrifugal, semi-rotary, ejector, vacuum pumps and air compressors doing various work in the oil industry. These pumps may be steam, belt or chain driven or may be direct coupled to electric motors. They are made in a vast number of ways and of most materials. Not only do they pump the



Courtesy Foster Pump Works

Simplex Steam Pump

oils but they circulate the water, agitate the oil, feed the boilers and the filter presses, pump alkali and acid liquors, exhaust the various vessels, boost the gases, compress air, hydrogen, and the refrigerating gases and even fire our boilers.

For the general pumping of oil, the type of piston pump known as the general service pump is largely adopted. With this type of pump the so-called "hydraulic end" can be larger in diameter than the steam end, the proportion being inversely as the total pressure on unit area of the two ends less a factor for losses. The average low pressure piston pump has very little of the steam stroke working expansively and therefore the steam efficiency is very low It is very necessary, therefore, that we should make as much use as we can of the available pressure by increasing the area of the hydraulic end of the pump to its limit.

Centrifugal pumps, either belt driven or electric coupled, offer a good alternative to piston pumps when large quantities of oil, water or other liquid have to be moved and, provided that the suction side is free from air leaks, a good centrifugal pump more than holds its own with other types of pump when the quantity to be pumped is large. The great use of the centrifugal pump in oil works is to circulate the vast quantities of water that are used for cooling purposes. In picking this water out of the hot wells, circulating it over cooling towers and pumping it back into the mains, the centrifugal pump has no equal. If it were possible to standardize the pumps in an oilworks, I should certainly give priority to the positive rotary pump. These pumps are

made in all classes of metals and can be made to handle liquids of all viscosities. They are, moreover, designed to work at all pressures up to 500 lbs. per square inch and being without valves and with few moving parts they give very little trouble and their life is quite good.

I have used them, working with a variable speed gear, even for filter press work and for handling large quantities of oil for filtering they are very good. They are able to handle such materials as warm soap, caustic solutions, acid solutions, water glass solutions, resin soaps, glycerin, molasses, oil, water, benzene, and the other solvents used in extraction work. I have used them jacketed for pumping high melting point waxes and on one occasion I used one as a wet vacuum pump and from this temporary rig-up I should think that they could be designed to do this work admirably.

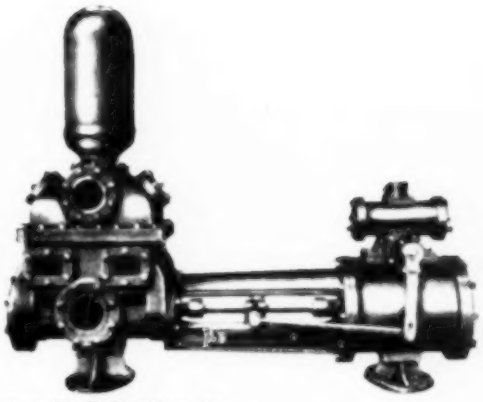
Courtesy Foster Pump Works

Portable Motor Driven Rotary Pump

Courtesy Foster Pump Works

Rotary Pump—Head Removed

Ejector pumps, by which I mean those pumps which induce a velocity in a fluid through the medium of a velocity in another fluid, are used chiefly for air agitation. They give very little trouble if kept clean and are able to move large quantities of air. Their easy manipulation and the fact that they need no gearing causes their adoption in a large number of cases where accessibility is bad and where space is limited. The field for the vacuum pump in oil works is a large one. All types are met with varying from the dry pump capable of holding a vacuum within .02″ of the barometer to the wet pump, possibly dealing with a much larger quantity of fluids, but holding a vacuum of only about 26″ or only within 4″ of the true barometer. Such processes as deodorizing, glycerin evaporating, glycerin distilling, fatty acid distilling, oil drying, and caustic soda concentrating all call for the right type of vacuum pump with the right capacity if the product is to be produced of the highest quality and at the right price.



Courtesy M. T. Davidson Co.

Heavy Duty Boiler-feed Pump

The type of drive that we employ is immaterial provided that it is economical. Steam drive to our pumps is the best where large variations of speed are desirable and where the pressures are subject to large variations: belt or chain drive where the speed and the pressures are constant but the working is intermittent: electricity where the load is steady and long periods without breaks have to be catered for.

There is another system of moving liquors that is in use in oil-works and that is the "montejus" or pneumatic system. Its use entails a system of enclosed vessels into which

(*Turn to Page* 41)

Some Mackey Tests on Cottonseed Oil

*Test Believed to Have Possibility of Some Value as an Index of Keeping Qualities**

By HERMAN ASPEGREN†

THERE is comparatively little to be found in literature concerning the nature of the tri-glycerides in oils and fats in respect to their relation to the keeping quality of the oils and fats, especially when used in various food products. I thought, therefore, that some experiments to determine the tendency to oxidation carried out by means

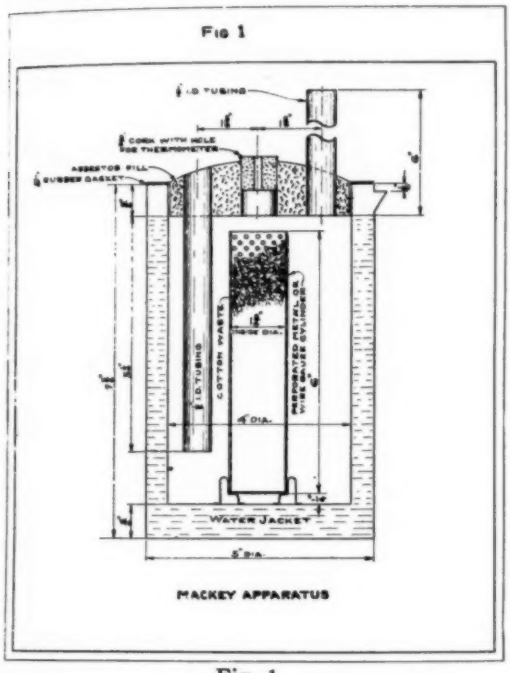


Fig. 1

of the Mackey test might throw some additional light on this subject. The highly interesting articles as published by Norman J. Thompson[1] and Hans V. Nabell[2] throw quite some light on the spontaneous heating of various oils, fats and fatty acids, and distinctly prove the value of the Mackey test when used to determine the tendency of spontaneous combustion. Many factors, however, influence the results. Mr. Nabell in his article shows how to some extent the results for same fat or oil may vary due to catalytic action of metallic oxides and soaps, even if present in only minute quantities in the material to be tested, or in the instrument itself, and Mr. Thompson in his article has shown how entirely different results may be obtained by varying the quantities of oil and quantity of waste used in the test, and also by varying the relation between the quantities of oils and waste. Nothwithstanding, I believe, however, that the Mackey test for determining the keeping quality of oils and fats may eventually prove to be of some value.

I, therefore, arranged that in the laboratories of the Portsmouth Cotton Oil Refining Corp. under the supervision of our Chief Chemist, Mr. A. W. Putland, quite a few tests were made. The results of these tests have not led to any definite conclusion as to the value of the Mackey test. However, I believe that the publishing of some of the results will be of interest to other chemists working on similar problems, and I, therefore, believe it opportune at this time to give some information as to what we have done.

Description of Tester

The instrument (Figure 1) we are using is a water-jacketed copper pot, 4 inches inside diameter, 7 inches inside height; a perforated 6 inch high, 1⅜ inch diameter brass cylinder, with 48 3/32 inch holes per square inch, stands in the middle of the pot, with ¼ inch clearance from the bottom. The pot is covered with a top extending down ¾ inches. Through the top extends the thermometer for recording the temperature of the cotton waste, further a ½ inch tube extending down to 1¾ inches from the bottom, and on the opposite side of the cylinder a ½ inch tubing vent is located.

In all the tests made reference to, 15 grams of the oils or fats to be examined and 15 grams of cotton waste were used, the cotton waste being thoroughly teased in order to thoroughly distribute the oil, and

*Presented at second Fall Meeting, American Oil Chemists' Society, 1928.

†*Portsmouth Cotton Oil Refining Corporation.*

[1]Industrial & Engineering Chemistry of March, 1927.

[2]Chemische Umschau Heft. 20 October, 1927.

packed in the upper half of the brass cylinder.

By using this instrument under uniform conditions, we were able to duplicate results fairly well, and a typical heating curve for refined cottonseed oil is shown on figure 2.

In order to find out how the changes in cottonseed oil during hydrogenation would influence the Mackey test, quite a few determinations were made on successive samples taken during the process of hydrogenation. Figures 3, 4 and 5 shows the results of the Mackey test on 10 samples taken April 17th, 1928, during the hydrogenation process of cottonseed oil with iodine number of 107

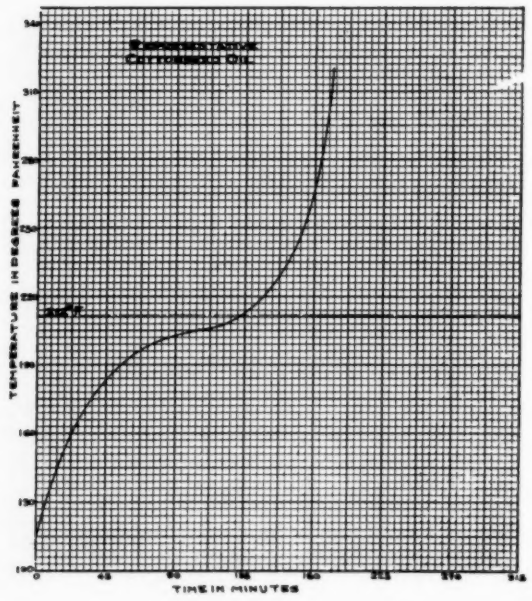


Fig. 2

when hydrogenated to iodine number 64.6. The table gives analyses of the various samples, showing iodine number and percentage of saturated, isooleic, oleic and linoleic acids. It will be noticed that the heating curves gradually flatten out and the tendency to heat in the Mackey test had nearly disappeared when the hydrogenation process had advanced so far as to reduce the linoleic acid content to 16 per cent and with linoleic acid practically disappeared, but 83 per cent still of isoleic and oleic acid, the fat did not show any tendency whatever to spontaneous heating during the Mackey test.

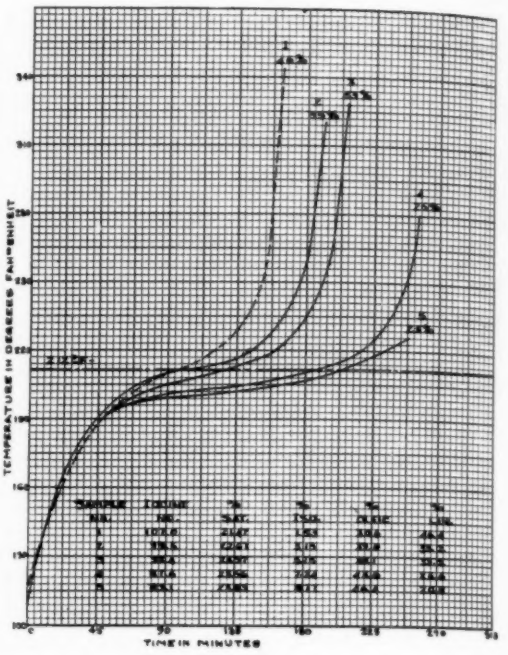


Fig. 3

Effects of Linoleic Acid

It was thought that possibly the Mackey test would show some difference between the linoleic acid present in the original oil

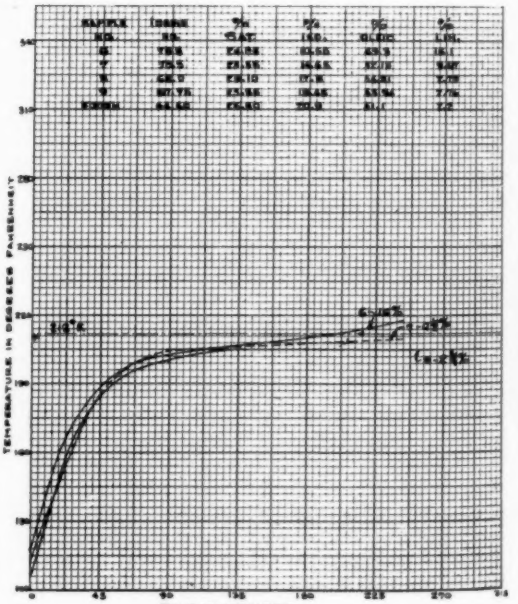


Fig. 4

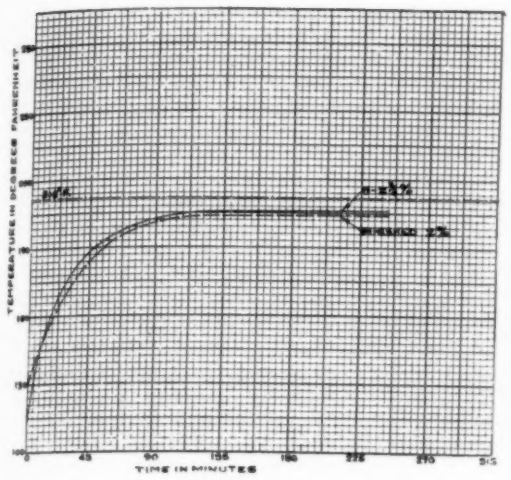


Fig. 5

and the linoleic acid during the latter part of the hydrogenation process, in the tendency to heat, and therefore oils from sample 1 and sample 8 were mixed in various proportions to produce a mixture of 33, 24, 16, 12 and 8 per cent linoleic acid content. Fig. 6 shows the results of the Mackey test of those samples. Comparing this chart with

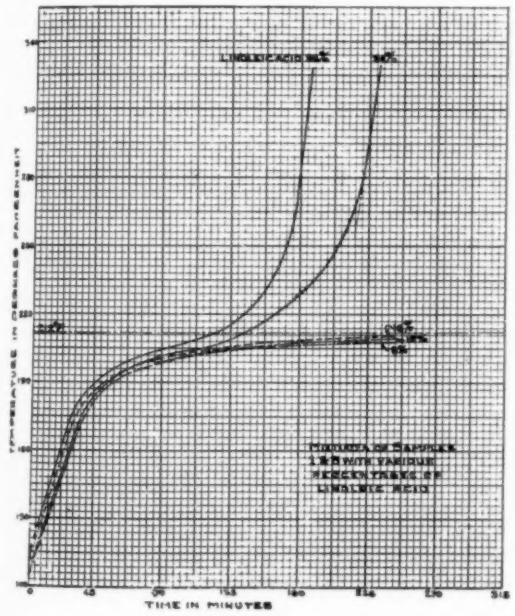


Fig. 6

chart in figures 2, 3 and 4 it would appear as if the same percentage of glycerides of linoleic acid which have not been exposed to the hydrogenation process would have a tendency to develop a steeper heat curve than that same percentage of glycerides of linoleic acid which have been exposed to the hydrogenation process.

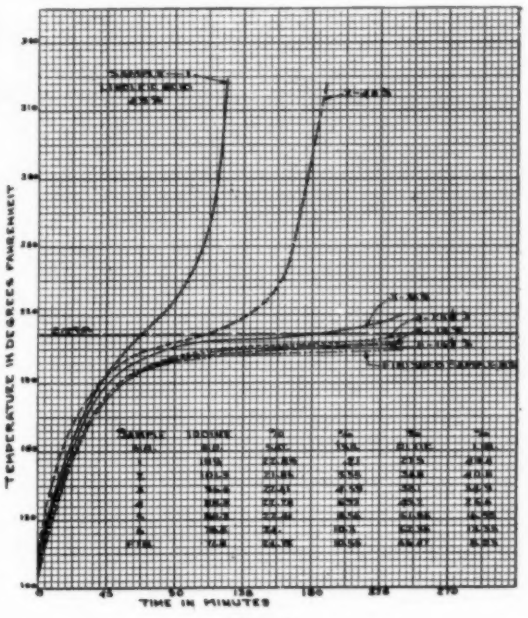


Fig. 7

Figure 7 shows the heating curves of 6 samples of cottonseed oil taken during hydrogenation June 14th, 1928, varying in percentage of linoleic acid from 49.4 to 8.23 per cent.

It will be noticed when comparing the results of the test made from the oil hydrogenated April 17th and June 14th that especially the samples with a percentage of linoleic acid of about 25 and 35 per cent show greatly different results in the two tests, however, the test in figure 8 also shows distinctly that oils with 16 per cent

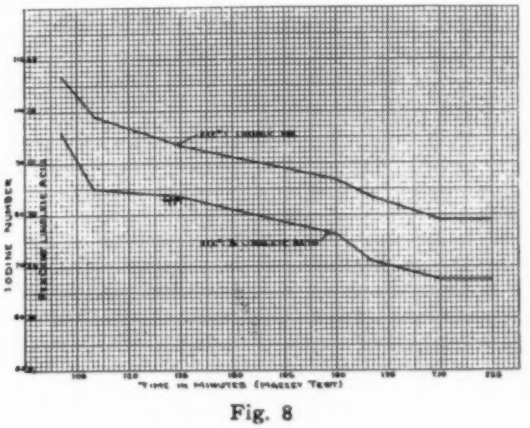


Fig. 8

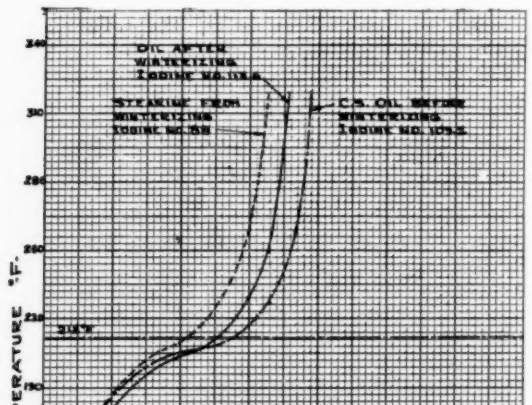

OIL AFTER WINTERIZING. IODINE VALUE 88
STEARINE FROM WINTERIZING IODINE NO. 138
C.S. OIL BEFORE WINTERIZING IODINE NO. 109.2
TEMPERATURE °F.
TIME IN MINUTES

Fig. 9

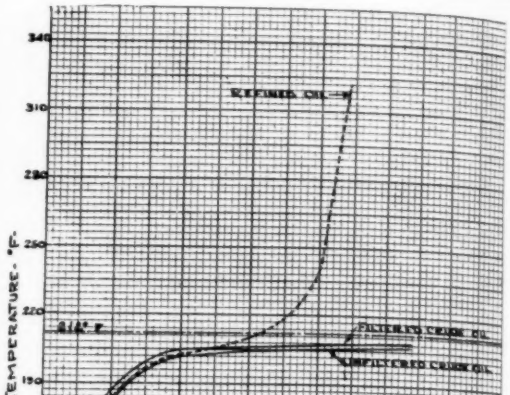


Fig. 11

or less linoleic acid content have very little, if any, tendency to heat.

Figure 8 shows the reaction of percentage of linoleic acid and iodine number to time required to reach 212 deg. F., the curves plotted from figures 3, 4 and 5.

Figure 9 shows some Mackey test curves of a cottonseed oil of iodine number 109.2 before and after having gone through the winterizing process; also shows the Mackey heating curves of the winter oil stearine separated in the process. It is remarkable that the winter oil stearine with the iodine number of 88 showed more tendency to heat than the original oil, which shows that the iodine number even when testing the same kind of oils cannot be taken as a guide for what the oil is going to develop during the Mackey test.

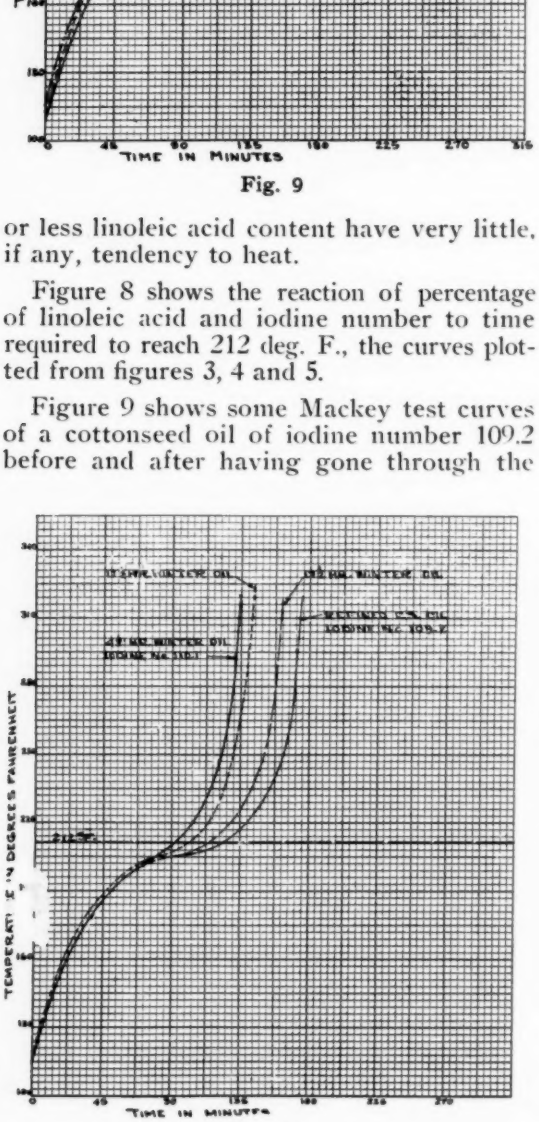


Fig. 10

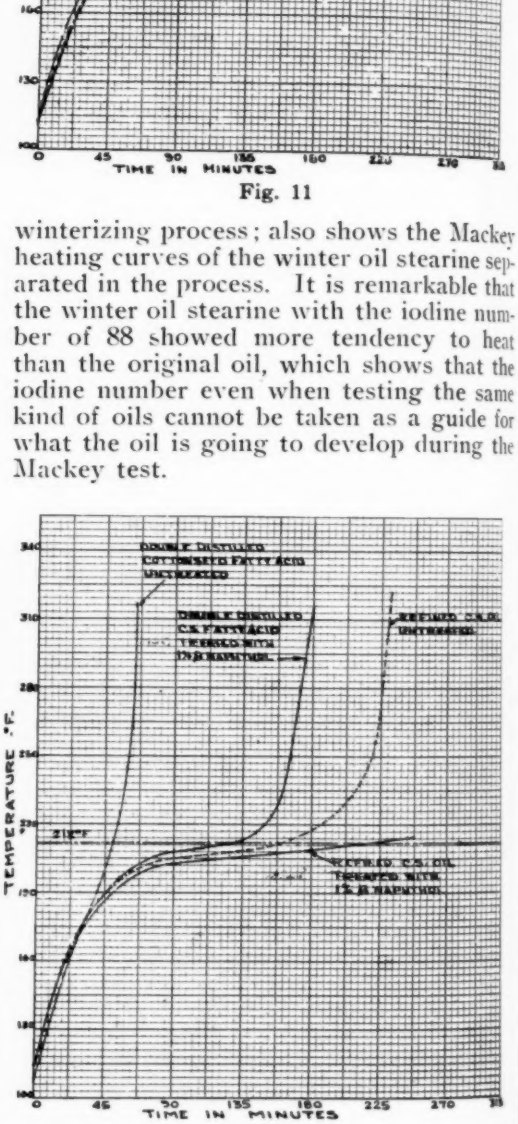

DOUBLE DISTILLED COTTONSEED FATTY ACID UNTREATED
DOUBLE DISTILLED C.S. FATTY ACID TREATED WITH 12% B. HAPNITOL
REFINED C.S. OIL UNTREATED
REFINED C.S. OIL TREATED WITH 1% B. HAPNITOL
TEMPERATURE °F.
TIME IN MINUTES

Fig. 12

Figure 10 shows the heating curve of some undeodorized winter oils of various length of winter oil test standing qualities. Also in this chart is included a heating curve of an undeodorized cottonseed oil of iodine number 109.2. However, the iodine numbers of the winter oils were not determined. The heating curves of the winter oils show the steepest curve for the weakest winter oil and the flattest curve for the strongest winter oil, which again is quite contrary to what may be expected.

I have not found in literature any specific information as to how the individual oil molecule is changed during the hydrogenation process. Except for the recent very interesting research published by G. Collin and T. P. Hilditch,[3] there is not much information to be found in literature as to how the individual molecules in the cottonseed oils and other vegetable oils are built, and if more was known about these matters we might find some answer to some of the seemingly confusing results from oils and fats in the Mackey test.

Results on Crude Oil

Figure 11 shows the heating curves of a crude cottonseed oil before filtration through filter paper and after filtration, as well as the curve for the refined oil obtained through the regular laboratory refining process. The refined oil was filtered through filter paper.

It is quite interesting to notice that the crude cottonseed oil apparently had no tendency thus far to oxidation,[4] and that the refined oil shows a somewhat flatter curve than ordinarily is the case with refined cottonseed oil. What caused the crude cottonseed oil to show practically no tendency towards heating during the Mackey test I do not know. Possibly some of the impurities in cottonseed oil may have a retarding catalytic influence. In this connection it may be mentioned that Bag and Novikow have found that *B*-Naphthol even if present in only a very small quantity in fatty acids has the power of very considerably retarding the oxidation of fatty acids, in other words acts as a negative catalyzer, and in figure 12 is shown a test made at our laboratory giving the heating curve during Mackey test of double distilled cottonseed oil fatty acids with and without *B*-Naphthol.

The fact that *B*-Naphthol seemingly acts as a negative catalyzer and further that crude cottonseed oil shows practically very little disposition to oxidize or heat in the Mackey test, would indicate that possibly several chemicals may be found which have the power to retard oxidation and act as negative catalyzers when present in vegetable oils. Possibly such chemicals or organic compounds may prove to be of considerable use not only in fatty acids for the textile industry, but also in the vegetable oil industry for preventing such rancidity which is caused by oxidation. Interesting experiments have been published by William J. Husa and Lydia M. Husa.[5]

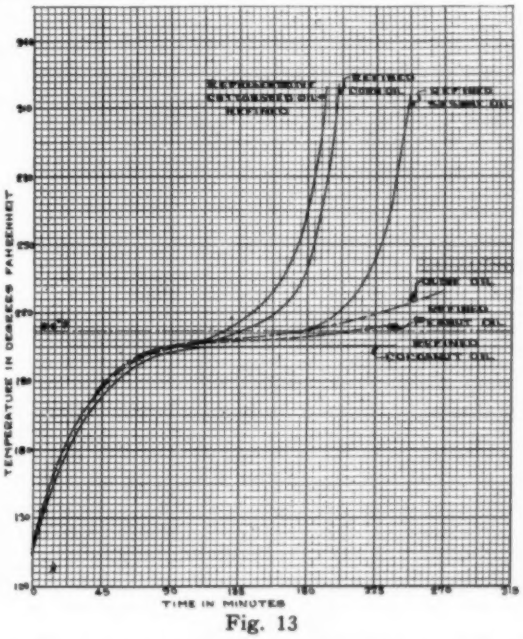


Fig. 13

Figure 13 shows some heating curves of refined cottonseed oil, corn oil, sesame oil, olive, peanut and cocoanut oil. These curves indicate that with decreased percentage of linoleic acid the Mackey test heating curves flatten, and evidently the Mackey curves are principally affected by the percentage of linoleic acid, and to a very much less extent by the percentage of oleic acid. In this connection it may be well, however, to refer to experiments made by Geo. E. Holm, Geo. R. Greenbank, and E. F. Deysher,[6] which show that in oxidation of cottonseed oil, compounds which give a tallowy odor are not found to any great extent, and further, that of the unsaturated acids in vegetable oils, oleic acid is mainly concerned in the products of tallowy odors and flavors.

[3]Journal of the Society of Chemical Industry, Sept. 21, 1928.

[4]See Geo. F. Holm, Geo. R. Greenbank and E. F. Deysher. Industrial & Eng. Chemistry, Vol. 19, No. 1, Jan., 1927.

[5]Journal of the American Pharmaceutical Association, March, 1928.

[6]Industrial & Eng. Chemistry, Vol. 19, No. 1, Jan., 1927; Vol. 16, No. 5, May, 1924; Vol. 15, No. 10, Oct., 1923.

'Virgin' Olive Oil--What Does It Mean?

Comparing the Characteristics of Cold-Pressed and of Refined Olive Oils

By Sidney Musher

FOR years, the word "Virgin" has promiscuously appeared upon can after can of olive oil—good or bad, Spanish or French, cheap or expensive—so that the word has lost its intrinsic value and its very meaning has become obscure in the mind of the purchaser.

The lack of scientific methods of distinction has likewise been a great factor in the failure of some importers and manufacturers of olive oil to put only the highest grade of virgin product into the tin, making it impossible for the purchaser to distinguish between various types of olive oil. Consequently, the buyer must rely solely upon the trade name and reputation of the particular concern with which he deals in assuming that he is buying *Virgin* olive oil.

Classes of Olive Oil

A "Virgin" olive oil is one which is extracted by cold pressure from only selected olives picked at maturity before fermentation or decomposition has set in—without heat or treatment of any kind, with the sole exception of proper sedimentation and filtration, resulting in a clean, high-grade, natural edible oil with all its essential characteristics undisturbed.

"Refined" olive oil, sometimes referred to on the label as a "pure" olive oil, is one produced by chemically treating oil extracted from a third or fourth run of olives, and which, in this crude state, is in an entirely disagreeable and indigestible condition. The methods of treatment given it include caustic-soda refining, bleaching, and deodorizing (in order to remove the objectionable odors and flavors), resulting in a clean, bland, tasteless oil.

The crisis of the World War, in demanding that the energies of the people be directed toward a maximum conservation and utilization of the food supply, led to a tendency which has manifested itself in the over-refinement of oils and fats as well as in the over-treatment of all other foodstuffs. As a consequence of our ever-increasing knowledge of vitamins and other food-accessory substances, and with the scientists and dietitians taking up the cry for raw and undenatured food products—extreme methods of treatment have been, to a considerable extent, discarded.

With all the oils and fats available for human consumption, including cottonseed, corn, peanut, sesame, and many others, there is none available on the American market, to any extent, in its virgin or untreated state—with the sole exception of olive oil. It is for this reason that an appreciation of the relative differences between the "Virgin" and the "Refined" Olive oil is of tremendous importance in this discussion.

The olive oil merchants, therefore, who can keep step with the advance of modern research and who do not only acknowledge the distinctly superior physiological and nutritional qualities of a "Virgin" olive oil but who put themselves in the position of buying directly from the European grower, so as to insure the quality of oil they place on the American market—are to be felicitated.

Non-Fatty Substances Important

In offering brief comparisons between the natural, edible olive oil and the commercially edible olive oil, it is necessary to appreciate that we deal not with the ninety-nine percent of chemically-pure fat or "glycerides" present, but with the very small proportions of non-fatty or "lipoidic" substances dissolved in the oil and which have accompanied it during its extraction process. It is this fraction with which we are concerned, inasmuch as the essential characteristics and properties are to be found in the substances other than the energy-giving molecular compounds which ordinarily occupy our attention.

Flavor and color are the two chief characteristics by which the layman judges the quality of olive oil. The "Virgin," or natural oils and fats are the only flavored ones; and upon their flavor depends, to a considerable extent, the value of the oil. It is, however, unfortunate that the flavor of the oil is not sufficiently ap-

preciated, so as to place that product which is most suitable to taste and digestion most in demand.

Extreme heat treatment used in the extraction and refinement of some olive oils drives off every semblance of flavor—the very perfume and bouquet which determines its relative value. Flavor and digestion are the cause and effect of proper metabolism; and if only to stimulate the appetite and increase the degree of digestibility, the advantage of a "Virgin" oil is notable.

The chlorophyll or coloring matter normally present in "Virgin" olive oils, although lacking exactly defined physiologic functions, is unquestionably concerned with life's processes. Man is not able to build within himself, by means of any human process, the color for his blood and tissues. Every bit of coloring matter—whether it be the orange of the skin or the ruddy complexion, must be transplanted from the food which he eats; and any means for removing these coloring constituents from one's food—even though it be for the sake of economy—is to be depreciated.

The golden-yellow color of a "Virgin" olive oil is familiar. It is not necessary to go further than to notice the effect upon the color after refining to assume that destruction of the chlorophyll probably ensues. The relationship of this color with which all natural plants and plant-products are endowed with the vitamin content of our food, is distinct, although scientific evidence fails to arrive at an understanding of this phenomenon.

Enzymes

In going more deeply into the discussion of the physical and chemical properties which distinguish a "Virgin" and a "Refined" olive oil, our attention is attracted to the presence of what is known as "enzymes." An enzyme is a substance in the presence of which certain necessary changes of physiological value to the plant or to the animal are produced. Each particular type of food has its own peculiar enzyme which aids in the digestion and assimilation of that product by the human system.

In the case of fats, we refer to the "fat-splitting" enzyme or "lipase," whose particular duty it is to aid in the breakdown of the fat molecule and in its rebuilding in the tissues of the body wherever necessary.

The value of human milk for infants has long been known to be superior to that of milk available from other sources. It is today thought that its superiority is due, to a large degree, to an abundance of enzymes present. Fat intolerance is generally associated with deficiency of enzymes in the stomach and may frequently be overcome by the use of a "Virgin" olive oil. These enzymes it has been distinctly shown are present only in the "Virgin" oils and are completely inactivated by heat or chemical treatment.

The ability with which fats and oils may be absorbed by the human system, when they have present in them enzymes undisturbed by heat or refining treatment, renders an unheated oil far more desirable than any other. The nutritional value of untreated olive oil, which perhaps has the widest medicinal use of any of our available fats and oils excepting castor oil and codliver oil, is greatly enhanced by the presence of these particular types of lipases—although neither the medical profession nor the layman has awakened to reasons for acknowledging their superiority.

Keeping Qualities

Rancidity, or spoilage, has attracted the attention of the manufacturer of olive oil toward a "virgin" product, for selfish purposes alone. It has definitely been found that a "virgin" olive oil will keep over four times as long as a "refined" olive oil; but the manufacturer is frequently reluctant in purchasing only this highest quality because of the additional price he is forced to pay for the "virgin" oil.

The degree to which an oil keeps has a very profound bearing upon its digestibility. It is of paramount importance that the ultimate consumer of olive oil does not use an oil in its rancid or even near-rancid state, for not only will indigestion be caused, but actual harm will result to the tissues.

Vitamins

A study of the presence of vitamins—those elusive life-giving substances which have defied direct analysis for a number of years—gives some very interesting information concerning the advantages of "Virgin" olive oil over the refined product. It has been distinctly found that certain vegetable oils, before refining, are good sources of the fat-soluble vitamins. Even scientists are just awakening to a realization that former discrepancies of vitamin content may be due to methods of treatment and refining given the products with which they were experimenting.

As a result of laboratory experimental work, it has been accurately determined that the digestibility and nutritive value of a "Virgin" olive oil is far superior to that of a "Refined" olive oil. Were we to attempt a scientific explanation of the many underlying phases of this work, it would require a scientific thesis, which is beyond our present intention.

Aside from the many technical points involved, however, we should pay some attention

(*Turn to Page* 33)

RECENT PATENTS

U. S. Patents

PROCESS OF PURIFYING OILS AND FATS. No. 1,685,195. Wilhelm Gensecke, Bad Homburg, Germany, assignor to American Lurgi Corp., New York, N. Y., a corporation of New York. Filed Feb. 5, 1925, Serial No. 7,180, and in Italy Feb. 15, 1924. 2 claims.

1. In a process for the purification of oils and fats containing free fatty acids, the steps of slowly introducing a soda solution in amount sufficient to neutralize the free fatty acids into a body of the oil or fat to be purified, and continuously removing the water content of the reaction mixture by evaporation during the neutralization process in an amount at least equal to the amount of water introduced in the form of the soda solution plus the amount formed by reaction.

STIRRING MECHANISM. No. 1,689,733. Patented October 30, 1928 by Joseph Trimby Lawrence, of Jersey City, New Jersey, assignor to Mitchell-Rand Mfg. Co., a corporation of New York.

A device of the character described comprising a kettle, a supporting beam extending across said kettle and detachably secured thereto, a cylinder mounted upon said supporting beam and extending downwardly therefrom into said kettle nearly but not quite to the bottom thereof, said cylinder being normally stationary and being provided with spouts extending outwardly and downwardly from it in order to direct the flow of loose material downwardly from the top of said cylinder into said kettle, a guard plate mounted within upper portion of said cylinder, a revoluble shaft extending through said guard plate and axially downward through said cylinder, a conveyor thread carried by said shaft and located within said cylinder in order to crowd loose material against said guard plate and thus to cause the discharge of said loose material from said spouts, and means for turning said revoluble shaft.

SEPARATION OF BUTTERFAT FROM BUTTERMILK AND BUTTERMILK WHEY. No. 1,683,728. Arthur L. Rushton, Omaha, Neb., assignor of one-half to Munson H. Lane, Washington, D.C. Filed Feb. 16, 1927. Serial No. 168,669. One claim.

A process of separating butterfat from sour cream buttermilk by the use of a centrifugal separator, which consists in first chemically treating the buttermilk with a suitable reagent to materially reduce the clogging tendency of the casein in the buttermilk, then subjecting the treated buttermilk to centrifugal action in a cream separator for a period substantially larger than in ordinary cream separation.

PROCESS FOR RECOVERING BUTTER FROM BUTTERMILK. No. 1,683,729. Arthur H. Rushton, Omaha, Neb., assignor of one-half to Munson H. Lane, Washington, D.C. Filed Sept. 29, 1927. Serial No. 222,945. 4 claims.

4. A process for treating sour cream buttermilk or buttermilk whey to recover a portion of the butterfat thereof, which consists in effecting a primary separation to separate the recoverable from the non-recoverable fat portion, the primary separation consisting in passing the buttermilk or buttermilk whey through a centrifugal separator at approximately the same rate used for separating the cream from whole milk, recovering the fluid emerging from the cream outlet of the separator, then effecting a secondary separation by passing such recovered fluid through a cream separator at a substantially less rate than that employed in treating whole milk, recovering "buttermilk cream" from the cream outlet, then churning said buttermilk cream to obtain butter.

C. P. McCormick of Baltimore, speaking at the Copley-Plaza Hotel, on the second day of the Mayonnaise Products Manufacturers' Association Convention, said that eating of sandwiches has increased 215 percent and the consumption of salad has jumped 110 percent in the United States in the last 10 years.

Shortening and Oil Prices Dec., 1928

The Code of Trade Practices adopted by the Shortening and Oil Division of the Interstate provides that whenever subscribing companies change their prices such changes shall be made public immediately. To make this provision effective a price reporting plan was adopted which requires each company to furnish the Secretary of the Division its current prices and terms on the bases of which its sales of Shortening, Cooking and Salad Oils are being made. Such information is then simultaneously reported by the Secretary to all members and is made public through trade papers or other media to all who are interested in receiving the information.

While there is always more or less variation in sales provisions between companies and frequent local exceptions to general prices and terms reported to that Division and interchanged, a review of December price information shows the following range generally prevailing during the month:

Shortening—Tierce Basis

Northern States—East of Rocky Mountains, 12 to 12¼.

Southern States—East of Rocky Mountains, 11¾ to 12.

Pacific Coast States, 12½ to 12¾.

Salad Oil

Northern States—East Rocky Mountains, 12 to 12¼.

Southern States—East of Rocky Mountains, 11½ to 12.

Pacific Coast (Port Cities), 11⅝ to 12¼.

Cooking Oil—White

Northern States—East of Rocky Mountains, 11⅞ to 12⅛.

Southern States—East of Rocky Mountains, 11⅜ to 11⅞.

Pacific Coast (Port Cities), 11½ to 12.

Cooking Oil—Yellow

⅛c less than White.

The Shortening and Oil Division of the Interstate Cotton Seed Crushers' Association is that section of the association which includes oil refiners and shortening manufacturers, as its name implies. This division was newly reorganized in September last and now holds regular monthly meetings. At the December meeting, held at the Washington Hotel, Washington, D. C. on December 18th, the following members and visitors were present:

Armour & Company, G. G. Fox and H. F. Scheideman; Aspegren & Co., Inc., Louis Rosenstein and Ben Radskin; Atlantic Lard Co., C. F. How; The Blanton Company, A. E. Willert; Cudahy Packing Company, W. R. English; International Vegetable Oil Co., L. P. Brown, Jr.; Interstate Cotton Oil Refining Co., C. A. Sanford; National Cottonseed Products Corp., T. H. Gregory; Procter & Gamble Co., J. F. Rogers and J. L. Cameron; Southern Cotton Oil Co., T. O. Asbury and J. P. Doyle; South Texas Cotton Oil Co., (Chairman) R. F. Crow; Swift & Company, O. E. Jones, A. B. Lynch and F. E. Bailey; Van Camp Packing Co., L. H. Thomas; Wilson & Company, Ernest Kissling; Corkran, Hill Co., Baltimore, Md.; Wm. Schluderberg, T. J. Kurdle Company, Baltimore, Md.; C. F. Simonins Sons, Inc., Philadelphia, Pa.; Wynne Lard & Provision Co., Norfolk, Va.; Jacob Dold Packing Co., Buffalo, N. Y.; Hermitage Lard Co., Richmond, Va.

The paramount aim of this division is to elevate the ethical and economic standards of business transactions in the oil refining and shortening industry to the highest possible plane, and because of this purpose the division's work is beneficial alike to members and non-members engaged in these trades. The division has a well-formulated program of advancement for its industries and should receive the membership support of every American manufacturer engaged in oil refining or shortening manufacture.

The next regular monthly meeting of the Shortening and Oil Division will be held at Chicago, in January.

Federal Commission Rules on Castile Soap

The famous "Castile" soap controversy advanced another step on December 12, when the Federal Trade Commission issued a "Cease and Desist" order against James S. Kirk and Co., prominent soapmakers, stipulating that thereafter the words "Castile" and "Olive Oil Soap" shall not be used by the respondent company to designate any soap not made wholly from olive oil. Provision is made for qualifying descriptions of soap not sold as "Castile Soap," but containing other oils or fats in addition to olive oil. The order was passed by a divided vote of the Commission and Commissioner William E. Humphrey entered a dissenting opinion with the order, while Chairman Abram F. Myers made a statement as to why he voted for the order.

Several of the respondent's soaps, according to the findings of the Commission, contain ninety per cent olive oil and ten per cent coconut or other oils. One soap was composed as to its fat composition of sixty per cent tallow, ten per cent coconut oil and thirty per cent olive oil. Another one contained eighty-eight

per cent tallow, ten per cent coconut oil and two per cent olive oil. Some soaps were made wholly of coconut oils. These were advertised as castile soaps.

Commissioner Humphrey disagreed with the majority opinion and stated so, in part, as follows: "I cannot agree that the facts in this case warrant the issuance of an order. In my judgment there is no evidence to sustain the contention that castile soap in the United States means soap made exclusively of olive oil. I agree with the Trial Examiner, who ought to have a better understanding of this case and especially of the evidence, than anyone else. He says: "For seventy years in the United States it has been the ordinary, usual and general custom of all manufacturers of soap to use in the castile soap, made and sold by them, oils or fats other than olive oil, and there *is no evidence whatever* that there has been a soap called 'castile' made in the United States for toilet and general household purposes which was made exclusively of olive oil as its fat or oil ingredient. There have been throughout the whole of this period castile soaps made from coconut oil exclusively—tallow and coconut oil—tallow, coconut oil and olive oil—coconut oil and olive oil—and various admixtures of these oils or fats."

In commenting on the Federal Trade Commission's order in this Castile soap case *"Soap"* says:—

"After nine or ten years of legal hair-splitting over the composition of castile soap, the Federal Trade Commission finally issued, on December 12, a formal cease and desist order against James S. Kirk & Co. The company is accused of unfair competition in selling castile soap not made wholly of olive oil. Over a thousand witnesses have been heard, volumes of testimony have been taken and several hundred thousand dollars have been spent in prosecuting and defending the case before the Commission. And, as yet, the case has not got into the courts. The end is not in sight.

Of all the farces which have been perpetrated upon the American public by a government commission, the handling of the castile soap case wins the palm. Its importance to the average American is no greater than the color of the whiskers of the pet cat of the King of Siam. Whether castile soap is made from tallow or olive oil does or will not make one iota of difference in the morals, happiness, or health of the country, or its babies. And yet, thousands upon thousands of dollars of public money have been spent. The decision one way or the other is without moment except among those soap manufacturers or importers who may be injured or benefitted if and when the cease and desist order of the Commission is enforced by a court decision.

The laughable part of the case is the supposed public consciousness of the exact composition of castile soap which the Commission believes it has discovered, and upon which in part it bases its cease and desist order. In fact, the case depends to a great extent on the public's "knowledge" of the ingredients of castile soap. To establish this knowledge, the Commission called hundreds of witnesses and loaded the records with enough trash to discredit the whole case. And, then, the experts were heard, both real and imaginary. It seemed that most anybody who ever heard of castile soap could, without difficulty, qualify as an expert. The hearings swarmed with experts, some well-known in the soap industry, and some whose testimony was twaddle and only helped to increase the proportion of incompetent evidence."

The Bureau of Foreign and Domestic Commerce of the Department of Commerce, Washington has for distribution copies of the annual report of the Hull Seed, Oil and Cake Association which contains suggested changes in the contract terms for linseed, East Indian cottonseed, Manila hemp seed, soya beans, coromandel ground-nuts, etc.

The World's Olive Oil Production

A report based on the investigation of the Federation of Cooperative Oil Producers in the South of France and of the Official Service of Oil Cultivation of Marseilles has just been issued.

This report states that it is probable that the world's production of olive oil this year will show a large deficiency. It is assumed from these investigations that the world's harvest will be little more than 5,500,000 metric quintals (cwt.) which is less than the annual average of 6,840,000 quintals in the years 1921 to 1925. The actual production in 1927 is put at 9,557,000 quintals, and the estimate for 1928 is 5,550,000 quintals, which quantity is less than the world's output in 1926, which amounted to 5,810,000 quintals, and was considered to be very short. The estimates for 1928 indicate a production of 1,700,000 quintals in the Spanish peninsula (6,810,000 quintals in 1927), France, 80,000 quintals (90,000 quintals in 1927), Italy, 1,600,000 quintals (1,345,000 quintals), Greece, Syria and Turkey 1,600,000 quintals (809,000 quintals, and North Africa, 570,000 quintals (503,000 quintals in 1927).

Notes of the Industry

Mayonnaise Definition Issued

An organized effort to pre-empt the use of the word mayonnaise for oil and egg salad dressing containing olive oil as the only fatty ingredient, has met defeat at the hands of the U. S. Department of Agriculture, who have issued the following definition and standard for mayonnaise:

"Mayonnaise, mayonnaise dressing or mayonnaise salad dressing is the clean, sound, semi-solid emulsion of edible vegetable oil and egg yolk or whole egg, with vinegar and/or lemon juice and with one or more of the following: salt, spice, sugar. The finished product contains not less than 50 percent of edible vegetable oil, and the sum of the percentages of oil and egg yolk is not less than 78 percent."

The Food Standards Committee of the Department thus has recognized the fact that the American public demands mayonnaise and mayonnaise products made from highly refined odorless and tasteless oils with low free fatty acid content.

To Expand Vegetable Oil Reports

At a conference between fat and oil factors and officials of the Foodstuffs Division of Bureau of Foreign and Domestic Commerce, it was decided to give greater publicity to foreign fat and oil trade information being gathered in London by Frank Messenger, recently appointed trade commissioner for oils and fats. His weekly reports will be printed practically in full in the oils section of the division's weekly, *Foodstuffs Round the World*. At a later date, it may be decided to publish more information on olive oil conditions in the Mediterranean region, palm oil from Sumatra and the West Coast of Africa, and other vegetable oils. Present at the conference were: A. S. Abbott, secretary of the Institute of Margarin Manufacturers; Christie Benet, counsel for Interstate Cottonseed Crushers' Association; John B. Gordon, Bureau of Raw Materials for the American Vegetable Oils and Fats Industries; R. F. Crow, Texas Cotton Oil Co., Houston; J. F. Rodgers, Procter & Gamble Co., Cincinnati; Sidney Musher, Pompeiian Olive Oil Co., Baltimore.

C. P. McCormick, president of Mayonnaise Products Manufacturers' Association, recently appointed the following committee chairmen: Legislative Committee, B. S. Pearsall, B. S Pearsall Butter Co., Elgin, Ill.; Glass Container Committee, E. H. Farmer, Owens Bottle Co., Toledo; Transportation Committee, R. J. Miedel, Hazel-Atlas Glass Co., Wheeling, W. Va.; Trade Practice Committee, William R. McKeldin, Atmore & Son, Inc., Phila.; Publicity Committee, W. R. Collins, Royal Baking Powder Co., B'klyn.

Expect Larger Palm Oil Crop

Production of palm oil and palm kernel oil in Malaya has increased rapidly since the start of the industry there five years ago. It is expected that the 1928 palm oil crop will total 1,382 tons of oil, an increase of 51% over the 915 ton crop of 1927. The palm kernel yield is estimated at 327 tons, a 77% increase over the 185 tons produced last year. These estimates were made recently by D. H. Grist, Chief Agricultural Economist of the Department of Agriculture of the Federated Malay States.

Solvay Alkali Schedule

The schedule of alkali prices for 1929, recently issued by Solvay Sales Corp., New York, is as follows: Light 58% soda ash, car lots, works, is $1.15 per 100 lbs. in bulk, $1.31 in bags, and $1.55 in barrels. Dense 58% ash, car lots, works, is $1.22½ per 100 lbs. in bulk, $1.37½ in bags, and $1.55 in barrels. Extra light 58% ash, car lots, works, is $1.32 per 100 lbs. in bags, and $1.67½ in barrels. Spot shipments are quoted at 2½c per 100 lbs. above the contract prices given above. The schedule for 1929 caustic soda is as follows: solid, $2.90 per 100 lbs. in drums; liquid, $2.55 per 100 lbs. in tanks. Spot prices for caustic are 5c per 100 lbs. above the quoted contract price.

Cultivation of Chinese soy beans, as an industry in itself, or as a side issue to the serious business of wheat growing, is to be undertaken by a group of Saskatchewan farmers, according to the Canadian Press. When Dr. Tehyi Hsieh, Chinese statesman, visited Regina recently, he spoke of the possibilities in the growth of the soy bean in Canada. A group became interested in the plan and their experiments convinced them that the idea was distinctly practicable.

Mayonnaise Assn. to Meet Informally

The Mayonnaise Products Manufacturers Association plans to hold meetings of the Board of Directors and of Committees in connection with the National Canners Convention to be held at the Hotel Stevens in Chicago, January 21-25.

The schedule of Mayonnaise Manufacturers' activities for the Convention is as follows:

Monday and Tuesday, January 21 and 22

Committee meetings. It is believed that these two days can well be spent in getting committees together for discussion of plans, for reports, etc., and to get up any recommendations for the Board which will meet the following day.

Wednesday, January 23, 1929

10:30 A.M. Meeting of Board of Directors, Officers and Committee Chairmen at Congress Hotel.

2:00 P.M. Informal meeting of all ACTIVE members of the Association at Congress Hotel.

3:30 P.M. Informal meeting of both ACTIVE and ASSOCIATE members of the Association at Congress Hotel.

Informal Meetings

While it is true that no regular mid-year meeting of the Association is called for this year, it was deemed wise to take advantage of this opportunity when so many members will be in Chicago, to at least provide a time for such meetings, and because of the magnitude of the Canners' Convention, this advance notice of such meetings is being given, so that members may have opportunity to meet one another in a designated place.

A shipment of palm kernel oil, larger than any ever before brought into the United States, was recently unloaded from the Shipping Board freighter *Quaker City*, at Philadelphia, according to *Philadelphia Public Ledger*. The importer who handled the shipment denied that it was of any unusual size, calling the publicity an attempt on the part of the Philadelphia Board of Trade to boost the home port. He stated that the shipment amounted to only 700 tons, and that amounts exceeding 3,500 tons had often been received.

Montgomery, Straub & Co., Inc., New York cottonseed oil brokers, ceased operations on Dec. 31, and the business will now be carried on by the new firm of Straub & Barry, composed of Robert F. Stuart, Robert P. J. Barry, Walter G. Straub and Harold J. Henderson.

C. W. Andrus & Son, cottonseed oil brokers, New York, admitted C. Walton Andrus to general partnership in the firm, effective Jan. 1.

Consolidation of Commercial Labs.

The Benedict Laboratories, Inc., and the Chicago Chemical Laboratories have just consolidated, and from now on will be known as the Illinois Chemical Laboratories, Inc.

The Benedict Laboratories, Inc., was organized in 1918 as a commercial laboratory, doing analytical and consulting work. In 1923, the equipment and personnel of the Alsco Analytical Laboratories, organized in 1909, and the Illinois Chemical Laboratories, organized in 1901, were taken over. The consolidation, then, of these laboratories with the Chicago Chemical Laboratories, gives this organization the distinction of being not only one of the largest commercial laboratories in the middle west, but also one of the oldest.

Lage & Co., members of New York Stock Exchange, admitted W. E. Fackert, formerly of Southern Cotton Oil Co., New York, to general partnership in the firm, effective Jan. 1.

National Cottonseed Products Corp., Louisville, recently requested lower freight rates on cottonseed shipped from Tennessee points in a complaint filed with the Interstate Commerce Commission.

Alchua Tung Oil Co., subsidiary of Benjamin Moore & Co., New York, recently put into operation a tung oil crushing mill at Gainesville, Fla. The yield from last season's crop, coming from 1,800 trees set out in 1924, is expected to be about 2,000 gallons of oil. Next season the company expects a sevenfold increase in output.

Oil and Fat Chemist—Corporation manufacturing products used in the food industries wants to increase its activities and widen its fields. There is an opening for a high grade chemist with a thorough knowledge of the oil and fat industries, who is capable of taking an active part in research and development work in the laboratory, and who also has ability and experience as a contact man with prospective customers. State full particulars in first letter. Address Box D-21, care *Oil & Fat Industries*.

Glycerin Production Drops

United States produced only 31,219,694 lbs. of crude glycerin between July and September, 1928, as compared with 66,576,442 lbs. produced in the preceding 6 months. Production of dynamite glycerin in the three months' period was only 10,321,720 lbs., as against 24,157,038 lbs. produced in the preceding six months. Production of chemically pure glycerin rose proportionately with a total of 15,739,372 lbs. in three months, as compared with 31,560,368 lbs. in six months. Exports of glycerin from the United States for the first nine months of 1928 were 1,778,521 lbs., valued at $224,155, a sizable increase over the 1927 figures of 354,641 lbs., sold for $84,909.

Rubberseed oil, made in the United States from imported rubberseeds, is now being sold in the vegetable oil market, and is finding consumers in the soap field, especially among the soft soap makers. Rayner & Stonington, Inc., 79 Wall St., New York, are sales representatives.

The consolidation of Gold Dust Corp. and American Linseed Co., has been approved by stockholders of both companies. Gold Dust common stock has been split up on a two-for-one basis, and a quarterly dividend of 64½c has been declared by the directors, this being equivalent to $5 per year on the old stock.

Procter & Gamble Co. recently declared a quarterly dividend of $1.50 a share on the 6% preferred stock, payable Dec. 15 on stock of record Nov. 23.

Stocks of crude cottonseed oil on hand in the United States Dec. 1, 1928, totaled 143,079,618 lbs., as compared with 165,070,471 lbs. available on the same day in 1927, according to a recent report of Department of Commerce. Refined oil to the amount of 322,857,460 lbs. was available, as compared with 416,140,651 lbs. on Dec. 1, 1927. On Aug. 1, 1928, 20,350,682 lbs. of crude and 335,993,223 lbs. of refined oil were held in various hands.

Virgin Olive Oil

(*from Page 26*)

to our medical advisors who emphatically suggest that less of the highly-refined foods be included in our diet. Within the past ten years, we have noticed a gradual change in the attitude of people toward returning to raw or unrefined foods.

Nature does not supply man's stomach with a refining, deodorizing, and bleaching equipment for every olive that he eats. It is broken down and assimilated entirely by the system, and the changing other than a purely natural one tends to unbalance this equilibrium of food digestion.

Under ultra-violet light the fluorescence of a natural oil is considerably different from that of a refined oil; and we believe that just as the ultra-violet lamp can distinguish between a "Virgin" olive oil and a "Refined" one, so the layman should be taught to understand what is meant when he sees the word "Virgin" upon a tin, and to appreciate that upon the manufacturer rests the responsibility of selling a product which he has labeled to contain only the highest grade "Virgin" olive oil—and not one which has had all its intrinsic properties and essential characteristics removed.

The annual banquet of Oil Trades Association, Inc., will be held in the Rose Ball Room of the Waldorf-Astoria Hotel on Wednesday, February 6. Members may reserve tables seating ten if they submit the names of their guests. This will be the last Oil Trades dinner to be held at the Waldorf, which is to be torn down in June.

Government and Definitions

(*from Page 9*)

more mayonnaise is prepared from other oils, such as peanut oil, sesame oil, cottonseed oil, and even soya bean oil, than from olive oil.

A little clique of importers would have us believe that the product was first made from olive oil. They have long memories indeed. Which of them has had a communication from one of Egypt's early Pharaohs, to inform him which was first used by man, the olive or the sesame seed? In this case, the petition of the importers has been denied, but in another matter reported in this issue of Oil & Fat Industries, another department of our Government has decided that a name, "Castile Soap" shall be restricted to only one kind of the many similar products which have enjoyed the use of this name for many generations. So are our taxes spent!

The Industry Improves

(*from Page 10*)

chemist whose work is in any way connected with fatty oils or soaps.

Your President hopes that every member will resolve to bring in at least one new member during the coming year, so that in the near future the Society will include every chemist who is qualified for membership.

Wishing you all a Happy and Prosperous New Year, A. W. PUTLAND, *President.*

AMERICAN OIL CHEMISTS' SOCIETY

Notes and Correspondence

Standard Analytical Samples

By A. W. PUTLAND, *Pres., A. O. C. S.*

IN January *Soap,* there is inaugurated a new Section which will be the official source of information relating to the Soap and Soap By-Product Section of the *American Oil Chemists' Society,* which Section was organized at our recent fall meeting in New York. The organization of this Section resulted from demands from various sources for an organization of soap chemists. While the Section is very young, plans have already been laid under the able chairmanship of A. K. Church for a very ambitious program. Through the kindness of Procter & Gamble Company, and Lever Brothers Company, respectively, three hundred pounds of soap and a drum of crude glycerin have been donated, both of which will be distributed for cooperative check analyses. This in itself is a very creditable undertaking; should result in closer agreement between different laboratories and will be reflected in dealings between buyers and sellers.

It has been recommended by active members of the Soap Section that the Society certify laboratories making commercial analyses as to their integrity and capability, to analyze Soap, Glycerin, etc., in the same manner as we now certify laboratories in the analyses of oil, meal, seed, and other products. This recommendation is now being considered by the Referee Board. It is hoped that in the very near future a standard detergency test will be recommended for adoption by the committee now working on this problem. A standard test has been long needed by the industry for determining the relative detergency of Soaps.

In addition to the standard methods of analysis of Soaps and Soap Powders adopted by the Society some few years ago, it is my belief that in the near future the Soap Section will develop standard methods of analysis of Glycerin, Fatty Acids, Pitch and the other Soap by-products and intermediates. I have every reason to believe that what the American Oil Chemists' Society has been and is to the oil industry, the Soap Section will be to the soap industry. The Soap Section is not a closed corporation, and we cordially and earnestly invite those who are interested in the soap industry to become actively identified with the soap chemists and to cooperate in an effort to solve the many problems confronting the Section.

The Work of the Soap Section

By A. K. CHURCH, *Chairman*

A FEW words about the recently organized Soap Section of the American Oil Chemists' Society—look over the Soap Section Committee as thus far constituted: R. W. Bailey, Stillwell & Gladding, Inc.; A. K. Church, Chief Chemist, Lever Bros. Co., (Chairman, Soap Section); C. J. Gundle, Works Chemist, Fels & Co.; L. F. Hoyt, Mgr. Research Dept., Larkin Co., Inc.; M. H. Ittner, Chief Chemist, Colgate & Company; H. J. Morrison, Chem. Div., The Procter & Gamble Co.; W. A. Peterson, Chief Chemist, Kirkman & Son (Sec. Soap Section); W. D. Richardson, Chief Chemist, Swift & Company; M. L. Sheely, Chief Chemist, Armour Soap Works; H. P. Trevithick, Chief Chemist, N. Y. Produce Exchange, R. B. Trusler, Industrial Fellow, Mellon Institute.

Every one of these men has made a sacrifice in consenting to serve, for they are all fully occupied otherwise. Glance at the names of the companies represented. These concerns do not encourage their staffs to undertake outside work unless the benefit seems evident.

The work contemplated by the Soap Section Committee at this time is the preparation of a standard sample of soap and a standard sample of crude glycerin so that every chemist responsible for the analysis of soap and/or of glycerin may have available a standard sample, the analysis of which is definitely known. With such a sample for reference, each chemist will be able to check the accuracy of his own work—each laboratory will have a sounder basis for belief in its ability to check with other laboratories than is at present the case. Is there a single soap chemist, glycerin chemist, chemist in any commercial laboratory doing referee work in soap or glycerin, not interested? Or any executive employing chemists, who would not think it well worth while to be assured that his laboratory safely checks with other laboratories?

On behalf of the American Oil Chemists' Society, its Soap Section invites all soap and glycerin chemists and/or their companies to participate in the work we shall undertake in connection with the soap and glycerin samples. Application blanks for membership in the A. O. C. S. may be obtained from Mr. J. C. P. Helm, Sec. A. O. C. S., 705 Tchoupitoulas St, New Orleans, La.; or from W. A. Peterson, Sec. Soap Section, A. O. C. S., c/o Kirkman & Son, Bridge and Water Sts., Brooklyn, N. Y.

The Bureau of Standards has issued as Research Paper No. 31, a reprint from Bureau of Standards Journal of Research, Nov., 1928, a paper entitled "Effect of Temperature Change on the Color of Red and Yellow Lovibond Glasses" by Dean B. Judd, Associate Scientist, Bureau of Standards. The author's abstract follows:—"The spectral transmission at 12 wave lengths in the visible spectrum of two Lovibond glasses (35Y and 7.2R) has been carefully determined at 15°C. and at 40°C. From these spectral transmission data the color changes corresponding to temperature interval of 25°C. have been computed. It was found, both for 35Y alone and for the 35Y 7.2R combination, that an increase of 25°C. is the practical colorimetric equivalent of adding 0.2 in Lovibond red units. This difference is almost negligible in the color grading of cottonseed oil. Preliminary work on two samples of cottonseed oil indicates that the oil changes in color with change in temperature even less than the glasses do. If all oils behave like these two samples, only extreme variations (more than 15°C.) in temperature need be taken into account in color grading cottonseed oil with Lovibond glasses."

This paper may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. The price is five cents.

Determining Fish-Oils Unsaponifiable

By WALLACE H. DICKHART

Recently the writer was required to analyze a number of fish oil samples for unsaponifiable matter employing the U. S. P.* The first few samples formed an emulsion which was difficult to break. In one instance it was necessary to discard the emulsified sample and repeat the test.

This led to an investigation of the source of the trouble. After some study it was decided to be due to faulty technique and the emulsion could be avoided, if a certain routine was followed which routine the writer would like to suggest to those who are interested in determining the unsaponifiable matter in fish oils such as cod liver, shark, whale, menhaden, etc.

Method: Weight 5 grams of fish oil into a 100cc flask, add 5cc of a 50 percent KOH (potassium hydrate) solution and then 50cc of 95 percent alcohol, boil under a reflux condenser for one hour or until the oil is completely saponified. Remove the reflux condenser and allow the alcohol to evaporate until the soap is dry. Care must be taken not to burn the soap. Dissolve the soap in 50cc of hot distilled water making sure there are no lumps present and the soap is a perfectly clear solution. Transfer the clear soap solution with 50cc of boiling distilled water into a 250cc glass stoppered tower which has had about 5cc of hot water previously placed in it, so that the soap solution does not stick to the bottom. The flask is then washed out with two portions of 5cc of 95 percent alcohol and the alcohol added to the soap in the tower. Mix the soap solution by slowly rotating the tower and cool by placing the tower either in ice water or under the cold water tap. When the soap solution is perfectly cold add 50cc of ether, shake very lightly and allow to stand. At this time 40cc of ether might settle out instead of 50cc. If there is not a break add 10cc of 95 percent alcohol. Do not shake. Siphon over the ether solution into a separatory funnel, add another 50cc of ether shake vigorously and allow to stand. If there is not a break add 1cc of cold distilled water, slowly rotate the tower and let it stand for a few minutes. Then add 2cc of 95 percent alcohol; do not shake. Siphon over the ether and again add two separate portions of 25cc each of ether to the soap solution, shake and permit to settle, repeating the process. Wash the ether solution in the separatory funnel with about 50cc of cold distilled water by rotating the mixture slowly so as not to form an emulsion. Continue the washing seven or eight times, then wash until the water shows no red color with phenolphthalein. Transfer the ether solution to a weighted beaker, allow the ether to evaporate to dryness on a steam bath, dry in an oven at 105° C for 15 minutes, cool and weigh, repeating until weight is constant.

*Tenth revision of the United States Pharmacopoeia.

The Norwegian whaling industry, which produced only 51,400 barrels of oil, valued at 3,100,000 crowns, in 1906, reached a total production of 704,000 barrels, worth 60,000,000 crowns, in 1927.

ABSTRACTS

David Wesson, *Abstract Editor*

COCONUT oil originating in the Dutch Indies may be adulterated with peanut oil or kapok oil at present prices. Peanut oil may be detected by determining the temperature of crystallization of the fatty acids, which will be several degrees higher than that of pure coconut oil acids. Kapok oil may be detected by the Halphen reaction. *Pharm. Tidschr. Nederl.-Indie* 4, 245-5.

Sulphur in soaps or in fatty oils, regardless of the form in which it may be present, can be detected by mixing the powdered dry soap with sulphur-free iron powder, heating the mixture to redness in a test-tube, cracking the tube and contents in dilute hydrochloric acid and testing for hydrogen sulphide. All sulphur is converted to iron sulphide under the conditions of this test. *Seifensieder Ztg.* 55; 289-90 (1928).

The nature of the unsaponifiable matter in train oil or dégras may be conjectured from the amount present and its iodine number. If the amount is high and its iodine number above 70, mineral oil or wool grease may be considered absent. If the iodine number of the unsaponifiable is below 50, the addition of such adulterants is indicated, in the absence of sulphonated or oxidized oils, which also lower the iodine number. *Ledertech. Rundschau* 20, 177-80 (1928).

Ultra-filtration has been suggested as a method of purification and stabilization of oils and fats. Tests of first-rendering lard over a period of four months indicated considerably less increase in free fatty acids in material which had been subjected to ultra-filtration. *Chimie et Industrie* Special No. 518-19 (April, 1928).

Variations in the character of the linseed oils of the world are closely associated with geographical location, according to the botanical investigations of S. and N. V. Ivanov, who find that the greater the number of unsaturated bonds in any oil, the greater is the dependence of quality upon climate. *Chem. Umschau Fette, Oele, Wachse u, Harze* 35, 157-66 (1928).

No detectable amount of simple trilaurin is present in coconut oil or palm-kernel oil, and little or no triolein. The fatty acids in these oils appear to be combined with glycerol on the principle of general even distribution, resulting in a conglomerate of a large number of individual glycerides. While the acidic groups of any individual glyceride are never all the same, two of them may be alike, or all three may differ. The whole amount of saturated acids linked with unsaturated acids in the mixed saturated-unsaturated glycerides is approximately equivalent to the amount of unsaturated acids present in the whole fat. G. Collin and T. P. Hilditch, *J. Soc. Chem. Ind.* 47, 261-91 (1927).

Mackey apparatus tests on the self-ignition liability of oiled wool have confirmed the greater safety of olive and peanut oils for wool-oiling and the danger of catalytic acceleration of spontaneous combustion when manganese and iron resinates and similar driers are used. *Leipzig. Monatschr. Textil-Ind.* 43, 162-3,210-1, 258-9 (1928).

Purification of Oleic Acid

Commercial oleic acid, according to analysis, contained 3.6 to 13.8% saturated fatty acids. In natural oils the percentage of oleic acid can be calculated as follows:—

$$A = 100 - O - 0.02258V$$

$$X = 1.986\ (A.-v) - 1.096$$

in which A = the total fatty acids,
O = non-saponifiable matter,
V = saponification number,
v = percentage of saturated fatty acids.
X = Percentage sought.

With this formula the following percentages of oleic acid were found for some oils and fats:—

Oil or fat	Oleic acid %
Olive oil	61
Almond oil	50.5
Earthnut oil	51.5
Oleomargarine	43.5
Lard	30.5
Palm oil	38.5
First run oil	37
Sesamum oil	37
Cottonseed oil	18

Thus olive, almond and earthnut oils are the best for preparing oleic acid. Bertram obtained

oleic acid for these experiments from earthnut oil, the latter containing 17.4 to 20.3% of saturated fatty acids, according to the source from which the oil came.

All the known methods for purification of oleic acid were examined to separate it from the saturated fatty acids, as, for example, purification with lead and barium salts, distillation in a vacuum, crystallization of lithium soaps in alcohol, ammonium and sodium soaps in ether, solubility of copper soaps in petroleum ether, purification with amides and anilines, fractional crystallization, bromination by the Grun method, freezing in petroleum ether, precipitation by treatment with dibromostearic acid in various solutions, as, for example, petroleum ether, acetic anhydride; petroleum ether and 70% alcohol; paraffin oil and 70% alcohol; paraffin oil and methyl alcohol; petroleum ether and aniline; petroleum ether and phenol; paraffin oil and phenol, etc.

All these methods gave unsatisfactory results. Oleic acid, it seems, has a tendency to form mixed crystals in presence of saturated fatty acids, and thus is explained the uselessness of the various attempts to purify this acid by crystallization.

Finally it was found that with mercury acetate in presence of acetic acid and methyl alcohol the percentage of saturated fatty acids could be reduced to less than 0.5%. Having studied the effect of quantity of these reagents, the following method to remove saturated fatty acids from crude oleic acid was obtained.

Oleic acid, 100 grammes, was heated in a water bath with 175 grammes of mercuric oleate, 140 cubic centimeters of methyl alcohol and 45 of glacial acetic acid. The mixture is then cooled and let rest for 24 hours, at the end of which it is filtered with a pump. The filtrate is treated with 50 cubic centimeters of hydrochloric acid (density 1.19) to split the complex products and after dilution it is briskly agitated with petroleum ether. The extract is washed with water and filtered. The petroleum ether is distilled in a water-bath and the residue saponified in the usual way. The soapy solution is agitated with petroleum ether to free it from non-saponifiable matter, and after adding diluted sulphuric acid the oleic acid is extracted with petroleum ether, the extract washed and the solvent distilled. Thus oleic acid, containing only 0.4 to 0.5% saturated fatty acids is obtained. This oleic acid, however, has a certain amount of acids with a greater degree of saturation (linoleic acid, etc.). It can be freed from these compounds also by crystallization cold in acetone as follows:—The oleic acid is dissolved in pure acetone, *viz.*, distilled on potassium permanganate and dried with anhydrous sodium sulphate, the solution being refrigerated at —10°C. to —15°C. in a mixture of alcohol and carbonic snow in a Dewar receptacle. After crystallization it is filtered through a funnel with double sides refrigerated with alcohol and carbonic snow. Care must be taken to cover the funnel with a sheet of glass to keep away moisture.

Repeating crystallization in this way a practically pure oleic acid is obtained.

The British Soap Manufacturer.

An investigation of the effect of various gases upon the yield in glycerine synthesis has shown that yields comparable with those obtained under atmospheric pressure may be had using SO_2,CO_2, N, and HCl, all under reduced pressure. *J. Soc. Chem. Ind.* 278-80T (1928).

New Books

The Fundamentals of Quantitative Analysis by Walter C. Blasdale, Ph.D., Professor of Chemistry in University of California, Los Angeles. Published by D. Van Nostrand Co., Inc., New York. 400 pages. Binding, black cloth. Third Edition, revised and partially rewritten. As a standard text on quantitative analysis, it presents the theoretical and practical features of a series of exercises in quantitative analysis, together with questions and problems on the text. The essential features of the original edition are unchanged, but two-thirds of the chapters have been re-written, the name of the book has been changed, and the group of questions and problems has been expanded.

Industrial Carbon by C. L. Mantell, Ph.D., Pratt Institute, Brooklyn. Published by D. Van Nostrand Co., Inc., New York. 400 pages. Binding, black cloth. Of especial interest to producers and refiners of oils and fats are the two chapters, totaling fifty pages, devoted to vegetable decolorizing carbon and carbon specialties. The book is a very thorough-going short survey of the uses to which carbon is put in the industrial world, and prepares the way for further literature on that important subject.

Market Report on

FATS, OILS AND GREASES

(As of Jan. 9, 1929)

NEW YORK—There were mixed price movements in the market for oils, fats and greases during the period just closed. Tallow and grease were priced lower, as additional stocks reached the market. Corn oil and lard were tending firmer at the close. Coconut oil declined after its recent advance. Red oil and stearic acid maintained their recent strong positions, and cottonseed oil was firm, though quiet, at last month's closing prices. Linseed oil also held firm with no price changes. Olive oil foots were materially higher as the result of a spot shortage, as was palm oil. The Christmas holidays cut into business hours, and materially lessened the amount of trading done. Another factor tending to keep the market quiet was the desire of consumers to keep stocks down before taking inventory.

COCONUT OIL

This market eased off slightly during the month, the price of spot oil dropping to 8¾c lb. inside. Coast tanks sold down to 8c lb. As a result of this weakness in coconut oil, copra prices were shaded a little from the 5c level of last month.

CORN OIL

Corn oil firmed during the period, as a result of increased demand and short stocks. It closed at 8¾c lb. for tanks, 10c to 10½c for bbls. and 12c to 12½c for refined oil. The fatty acid was priced at 12c.

COTTONSEED OIL

Prices held steady through the period after the advance of last month, brought on by shorter crop expectations. The market was uneventful, due to a lack of interest in the slightly higher prices. Crude closed again at 8½c to 8¾c lb. with P.S.Y. at 10c to 10½c lb.

GREASE AND LARD

Greases were off fractionally from last month's quotations. The market was quiet with trading a little below average. Closing prices were: yellow, 8⅜c to 8½c lb.; brown 8¼c to 8½c lb; house, 8¼c to 8⅜c lb.; white, 8¾c to 11c lb.; bone naphtha, 8⅛c lb. The market for lard was also quiet, but tending firmer at the close. Lard was priced at 11¼c to 11½c lb., with compound at 12c to 12¼c lb.

OLIVE OIL AND OLIVE OIL FOOTS

Olive oil continued the decline which it started in October, and reached a low level for the last half year, $1.28 to $1.30 gal. for spot, and $1.20 to $1.22 for shipment oil. There was little spot oil on hand and less demand for it. Foots were in demand, and featured the market with a sharp rise to higher prices. Quotations were 11c to 11¼c lb. for spot, with almost no spot stocks to cover. Shipments were selling at 10c to 10¼c lb. as the period closed.

LINSEED OIL

The linseed oil market quieted down as a result of the holidays, but prices held well. Reports from Argentina indicated that the flaxseed crop just harvested would total more than 100,000,000 bushels. This advance news failed to exert a bearish effect, for continued large building programs seem sufficient to provide an outlet for any excess linseed oil production. Crude oil in car lots closed again at 10c lb., with boiled oil in tanks at 9⅜c. Refined oil in bbls. closed at 10⅜c lb. Cake and meal were firmer.

PALM AND PALM KERNEL OIL

Sellers had only very small stocks of these oils, and so advanced the Lagos spot price to 9c and in some cases 9½c lb. Shipment Lagos sold at 8½c to 8⅝c lb. Shipment Niger was offered at 7⅞c to 8c lb., with spot at 8½c to 8⅝c. Kernel oil remained at 9⅛c to 9¼c in packages, and 8⅜c to 8½c lb. in tanks.

RED OIL AND STEARIC ACID

Heavy demand has recently boosted the price on red oil and stearic acid. These prices were maintained during the period, and stearic acid closed again at 18c to 18½c lb. for double pressed, and 20c to 20½c lb. for triple pressed material. Red oil was still 9⅞c to 10⅜c lb. for distilled, and 10⅜c to 10⅞c lb. for saponified.

TALLOW

After reaching a high of 9½c in November, city extra tallow dropped to 9c and in some cases to 8⅞c lb. late in December, as offerings increased. Fancy was off also, and closed at 9¾c lb.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of			
40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing			
36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing			
36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.14¾	.15
January arrival	lb.	.14¾	—
Coast, tanks, spot	lb.	.13½	—
January shipment from coast	lb.	.13½	—
February	lb.	.13½	—
bbls. or drs. 1c lb. above tank car prices.			
Coconut, Ceylon grade, bbls.	lb.	.09½	—
Coast, tanks	lb.	.08	—
Cochin grade, bbls.	lb.	.09¾	—
Manila, bbls.	lb.	.09¾	—
Tanks	lb.	.08½	—
Coast tanks	lb.	.08	—
Fatty acids, mill, tanks	lb.	.11¼	—
Cod, Newfoundland, bbls.	gal.	.65	.66
Copra, bags, Coast	lb.		.05
Corn, tank, mills	lb.	.08⅝	.08¾
Bbls., New York	lb.	.10	.10½
Refined, bbls.	lb.	.12	
Fatty acid	lb.	.10	
Cottonseed, crude, tanks, mill	lb.	.08½	.08¾
P. S. Y.	lb.	.10⅛	.10¼
Fatty acids, mill, bbls.	lb.	.10¼	
Degras, domestic, bbls.	lb.	.04½	.05
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03¾	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08¼	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbls., N. Y.	lb.	.08¾	.11
Yellow	lb.	.08¼	.08½
Brown	lb.	.08¼	.08½
House	lb.	.08¼	.08½
Bone Naphtha	lb.	—	.08⅛
Herring, coast tanks	gal.	.40	—
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.11¼	.11½
Compound, tierces	lb.	.12	.12¼
Middle Western, tierces	lb.	.11½	.11¾
Neutral, tierces	lb.	.13¼	—
Prime Western, tierces	lb.	.11¾	—
Lard oil, No. 1, bbls.	lb.	.12¾	—
No. 2, bbls.	lb.	.12½	—
Extra, bbls.	lb.	.13½	—
No. 1, bbls.	lb.	.12¾	—
Winter strained, bbls.	lb.	.14	—
Prime, bbls.	lb.	.16	—
Linseed Oil, boiled, tanks	lb.	.0960	—
Car lots, bbls.	lb.	.1040	—
Less car lots, bbls.	lb.	.1080	—
Less than 5 bbls.	lb.	.1120	—
Double boiled, less than five bbls.	lb.	.1150	.1160
Raw, tanks	lb.	.0920	—
Car lots, bbls.	lb.	.1000	—
Less car lots, bbls.	lb.	.1040	—
Less than 5 bbls.	lb.	.1080	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1080	.1120
Varnish grades, bbls.	lb.	.1100	.1140
Linseed cake, bags	ton	49.00	—
Meal, bags	ton	56.50	—
Menhaden, crude, tanks, Baltimore	gal.	.48	—
Light pressed, bbls.	gal.	.62	.63
Yellow bleached, bbls.	gal.	.64	.65
White bleached, bbls.	gal.	.67	.68
Mustard, bbls.	gal.	.90	—
Neatsfoot, cold pressed, bbls.	lb.	.19	—
Extra, bbls.	lb.	.13¾	—
No. 1, bbls.	lb.	.12¾	—
Pure, bbls.	lb.	.15¼	—
Oleo, No. 1, bbls.	lb.	.11¼	—
No. 2, bbls.	lb.	.11	—
No. 3, bbls.	lb.	.10	—
Olive, denatured, bbls., N. Y.	gal.	1.28	1.30
Shipments	gal.	1.22	1.24
Foots, bbls.	lb.	.11	—
Shipments	lb.	.10	.10½
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, casks spot	lb.	.09	.09¼
Shipments	lb.	.08¾	—
Niger, casks, spot	lb.	.08¾	—
Shipments	lb.	.08⅛	—
Palm Kernel, pkgs.	lb.	.09⅛	.09¼
Tank cars	lb.	.08⅛	.08½
Peanut, crude bbls.	lb.	.12	—
Mills, tanks	lb.	.10	—
Refined, bbls.	lb.	.82	.83
Perilla, bbls.	lb.	.18	—
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.03	1.04
Refined, bbls.	lb.	.84	.85
Red Oil, distilled, bbls.	lb.	.09⅞	.10⅛
Tanks	lb.	.09¼	—
Saponified, bbls.	lb.	.10⅛	.10⅞
Tanks	lb.	.09¾	—
Salmon, coast, tanks	gal.	.44	—
Sardine, coast, tanks	gal.	.45	—
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.12¼	.12½
Orient, coast tanks	lb.	.10	—
Sperm, bleached f.o.b., New Bedford,			
bbls.	gal.	.84	.86
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.18	.18½
Triple pressed, bags	lb.	.20	.20½
Stearine, oleo, bbls.	lb.	.10⅜	.10½
Tallow, edible, bbls.	lb.	.09¾	—
City extra, works, loose	lb.	.09	—
Special, works, loose	lb.	.08⅞	—
Tallow oil, acidless, bbls.	lb.	.12¼	—
Tanks, N. Y.	lb.	.12	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07¼	—
No. 2, coast, tanks	lb.	.06¾	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Pumping, Piping and Heating

(*from Page* 17)

the liquids are fed. Air at a pressure consistent with the work to be done is forced on the surface of the liquid. This pressure is imparted to the liquid and on the opening of an outlet forces the oil to its destination. The great advantage of this system is the great evenness of the pressure. In small installations, it has the great disadvantage that there is left at the end of a run a vessel full of high pressure air which cannot be used. In large installations, the high pressure can be alternatively transferred from one vessel to another and there is not the same loss.

Valves and Stopcocks

THE control of our processes is largely dependent on satisfactory cocks and valves and in a large works there is an assortment ranging from the tiny 1/16″ "pilot light" cock on the gas plant to the 20″ sluice valve whose weight runs into many hundreds of pounds. They must all, however, have one characteristic in common and that is they must be absolutely positive in action. I have seen, in oil works, in positions where the conditions were very trying, two valves or cocks placed on important mains with a small drain cock placed between them so that when the main was shut off any leakage from the first cock was side-tracked through the drain leaving the second cock to isolate the main at atmospheric pressure only. This I submit as bad. I am quite aware that there are conditions of control that are very difficult but I have yet to meet one where it has been impossible to get the right cock or valve for a specific task.

Undoubtedly the most difficult positions are those where gases at high pressures and temperatures mixed with fluids under the same conditions have to be isolated. Such a case occurs in hydrogenating oils where that most elusive of gases, hydrogen, is circulated at pressures up to 150 lbs. per square inch and with temperatures up to 220°C., in conjunction with oil at the same temperature and pressure. Add to these the scoring action caused by the diatomaceous earths circulating with them and you will have as pretty a problem for solution as any engineer will wish. The cocks and valves suffer the same conditions as the pipe lines they control and have to be chosen in conjunction with them. Thus we find cocks and valves made from the same variety of materials as the pipes and so made to stand those conditions we have already discussed under the subject matter of the pipes.

Process Vessels

THE process being carried out will determine the nature and material to be used for the various process vessels and these are not the same that govern the pipes and fittings connected to the vessels. As an example, wrought iron pipes are generally ruled out on caustic mains but soap pans—using the caustic brought by them—may be, and are, made of wrought iron plate. The same ruling holds good wherever chemical action takes place in a pan. A new series of conditions arise which are governed by the product which will be made in a pan and the excess of one reagent over another. The dilution of this excess has also to be taken into account. These rules are fairly obvious but it is no unusual happening to find plants designed rather from the point of view of the action of one reagent than from a survey of the whole position. Designers often differ in their choice of metals for the plant in any particular process but mild steel is the most useful metal for oil plant work and is used in the bulk of the plant: copper has a limited application: lead is used where acid liquors are used in excess: tin is used as a lining in some better class edible oil plants: nickel is sometimes used in our varnish works: Dural has been patented for high temperature deodorization owing to its limited action as an agent of hydrolysis: silver is used for edible fermentation processes to a small extent: while wood in the form of vats of various shapes forms a goodly proportion of the plant on the fatty acid side. Various alloys of the rare metals find uses in the small fittings while stainless steels and Monel metal are coming into rapidly expanding use.

Heating Devices

THE majority of our vessels are fitted with some form of heating device. These vary considerably in type as vessels may be jacketed, fitted with coils or with tubes or may have the temperature of their contents raised by means of an external heater when the heating medium is a fluid. They may also be heated by the ordinary fire, by gas or by oil furnaces or by electricity. The fluid in the jackets, tubes or coils may be either hot water, saturated steam, superheated steam, superheated water, or heated oil. With water heating whether at high or low pressure (i. e. superheated water in the case of high pressure water), no heat is used in converting the water into steam and, where the water is circulating

round and round, it is a very economical method as the furnace is only called upon to make good the heat lost in the circuit.

Water at 400 lbs. per square inch pressure can be heated up to 449°F. without being converted into steam. Therefore water at an initial temperature of 49°F. will need 400 b.t.u. to bring one pound of it to this temperature. Steam at the same temperature has needed another 790 b.t.u. to bring it to the same temperature (this being the latent heat of the steam at this temperature). It is the difference in temperature between the heated body and the heating medium that determines the rate of transference of heat between the two bodies so that any heat added to the heating medium which does not increase its sensible heat may become negligible from the transference point of view. Thus the steam with a total heat absorbed of 1,190 b.t.u. per pound will have no greater heat transference than water which has absorbed only 400 b.t.u.—assuming for the moment that the saturated steam wets the heating surface as much as the hot water.*

Where water is circulated the loss due to its heating effect is the only loss to be made good but in the case of the steam as soon as its latent heat has passed it is water at the same temperature and will be discharged by the steam trap and the whole of the sensible heat is liable to be lost.* The great difficulty with water at these temperatures is that of keeping the circuit filled at the requisite pressure, as if the pressure drops, steam is formed sometimes with explosive violence. An attempt to get a fluid to do the work of superheated water at ordinary pressures plus any slight additional circulating heat is to be found in the oil heating system. In this system oil at temperatures up to 300°C. passes through a system of pipes and thus to the work to be done, returning by another series of pipes to the furnace. The loss of heat being all that has to be made good, the oil circulating method of heating is fairly efficient but has its drawbacks in the comparatively low specific heat of the oils used as compared with water and in the comparatively low heat transference. A really well designed oil heating circuit will transmit about 40 b.t.u.s. per square foot of heating surface per hour per 1°F. temperature difference when heating water in an iron jacket (when working well). Its efficiency drops off however owing to the surface of the jacket becoming coated with char due to the destructive distillation which the oil undergoes at these temperatures.

Saturated steam is the best heating medium for the oilworks up to within about 20°F of its own temperature. Heating by means of superheated steam very often turns out disastrously unless extraordinary precautions are taken and, while the subject is worthy of a discussion on its own, I am afraid I must leave it with the bald statement that it is not an ideal heating medium and is best left alone until after a mature study of all the points in the problem. As a final point I would emphasize the great need of conserving the heat in any system used. There is a vast scope for ingenuity in the arrangement of heat interchangers in an oilworks.

Continuously day in and day out there are processes working where the liquids and gases used are being alternately heated and cooled. This cooling results in a large number of heat units being given up and it is one of the most important duties of the industrial engineer to see that these units are made to do useful work. The return of hot water that has come from steam to the boilers and the use of exhaust steam from various sources all give opportunities in this direction.

*Editor's Note: To us it seems that the latent heat of condensation will be transferred to the body being heated, otherwise steam traps would be of no service, and superheated steam would be superior to saturated for heating in coils (which is not the case). A system of returning steam trap condensate to the boiler saves a large portion of the sensible heat.

OIL & FAT INDUSTRIES

The Editor's Page

The Proposed Tariff

A SURVEY of the oil and fat industries indicates an extremely complicated situation where the proposed increase of the tariff to 45 per cent is concerned. A questionnaire sent out broadcast by *Oil & Fat Industries*, the results of which are discussed elsewhere in this issue in detail, showed very close to an even break among producers, refiners, and manufacturers of edible oil products. Some 53 per cent favored the tariff and 47 per cent were opposed to it.

That there should be a division of opinion on the tariff is only natural when it is realized that some produce and refine oils, others only refine oils, still others refine only imported oils, and many do two or more of these operations. Interests in the oil and fat industries lie in several different directions. To some companies, imports of oil and fats mean cheap foreign competition; to others, they mean a source of cheap raw material. Opinion is dictated almost wholly by the position which the company in question happens to occupy.

In the matter of a duty on Philippine coconut oil, the attitude is taken by most American oil producers that as far as American industry and Americans are concerned, the Philippines are as much of a foreign country as Holland or Africa. "Why should we enrich the Oriental population of the Philippines at the expense of American oil producers?" is the query of one producer. On the other hand, the attitude is taken by some people in the oil business that we must either give the Philippines their independence or else let them ship in their goods free of duty—that we cannot consistently build a tariff wall against our own colonies.

About a billion pounds of fatty oils are imported yearly by the United States with an average value of $125,000,000. Production of all oils and fats in the United States is roughly six billion pounds per year with a wholesale value in finished oil and fat products of over a billion dollars. From these figures, it is difficult to make any general conclusions regarding the possible effects of the tariff in the oil and fat industries because of the involved nature of the manufacturing interests. Certain large oil and fat consuming industries will be placed at a distinct disadvantage. Some oil producers and refiners will be placed in the same situation, while still others may be greatly benefitted.

We cannot see that a single blanket rate of duty whether it be 45 per cent or 4½ per cent is equitable for all oils and fats, and for all producers, refiners, importers and consumers. The tariff schedule for oils and fats should be worked out on a genuinely scientific basis after a thorough study of the situation. Edible oils and inedible oils will have to be separated and treated differently in tariff consideration. They cannot just be dumped into a general pot simply because they are fatty oils. And the oils must also be treated individually. Coconut oil needs one duty, peanut another, and fish oils still another.

In fairness to American industry, oil crushers, oil refiners, and oil consumers, we hope that great care is taken in the final adjusting of the tariff rates on oils and fats. Hasty action stampeded by selfish factions on one side or the other will not solve the problem permanently. An equitable tariff worked out on a scientific basis is much to be preferred to a temporary measure dictated by vote-seeking politicians.

Research Justified

Most large manufacturing organizations in the country today look with favor upon research, particularly chemical and engineering research. Every product and machine, every tool of modern business and industry, at some time or other in the past was the work of research men. The remarkable advances in synthetic chemistry, in mechanical and electrical engineering, in most every field of science and industry, date back to tedious, painstaking, and in numerous instances, expensive research work. New things in our modern civilization

do not just happen along. Somebody or other has done the work and somebody has paid the bill.

We find many apparently hard-headed business men in all types of industries who do not hesitate to state that they believe research is a waste of money. They are usually the "practical" men of business. They do not "believe" in research. They see it as a hopeless quest for the pot of gold at the end of the rainbow. They cannot appreciate anything but "results"—the work done today must show a cash profit tomorrow. And these are the men who every day save time, money and effort using the telephone, automobiles, modern railroad trains, and a myriad of products of chemistry—all of them products of long years of research.

One of the finest cakes of soap on the American market today is almost wholly a product of chemical research. Manufacturing difficulties were encountered in every step of its production for several years. One by one, research ironed them out. The product looks to be close to perfection, but still the research goes on seeking for something better. The commercial success of the soap has been almost sensational, but back of its success lies vindication of the research man—research justified.

The entire industrial structure of the world today is a monument to research. Every element in the prosperity and high living standards of America is a justification of research. Let him who fails to recognize its place in modern life and industry go back to his horse cars and tallow candles.

Marking of Labels

By a recent decision of the Court of Appeals of the District of Columbia, in the case of "Four Roses Products Co. vs. Small Grain Distilling and Drug Co.," December 3, 1928, it was held to be a deception and misrepresentation for a merchant or manufacturer to print the words "Trade-Mark Reg. U. S. Pat. Off." upon his labels unless the trade-mark had actually been registered in the Patent Office.

The Commissioner of Patents is bound by the decisions of the Court of Appeals of the District of Columbia, and the Trade-Mark Examiner will refuse registration to any applicant whose labels are prematurely marked with this legend.

Previous to this decision the Patent Office has permitted this marking to appear on the labels when the application was filed as it was considered a hardship to furnish labels in all cases as actually used without this wording. The applicant understood that if registration was refused the said marking would be discontinued.

The National Trade-Mark Company, Barrister Building, Washington, D. C., will gladly discuss this new ruling with any interested parties.

The World's Soya Bean Crop

Owing to the many new uses that are constantly being found for vegetable oils and the ever increasing popularity of oil cake and meal as a stock feed, oil seeds are year by year assuming a more important place in world trade, according to the Department of Commerce. World production for the year 1926 was approximately 35,900,000 short tons, of which about one-third was exported from the country where it was grown either in the form of seed or as oil and oil cake and meal, says Felix J. Pope, Foodstuffs Division of the Department.

Soya beans, which are of Asiatic origin, have been raised in China for many centuries. That country is still the chief source of supply and they play an important part in China's foreign trade. Manchuria is the great producing area, about 40 per cent of China's total crop being produced in that province. Last year China exported 7,576,493,000 pounds compared with 6,877,302,000 and 5,824,296,000 the previous two years.

Soya beans were first used for the production of oil and meal in the United States in 1910, imported seed being used. American grown seeds were first used in 1915 by cottonseed oil mills in North Carolina. The production in this country has increased rapidly in recent years; while no accurate figures are available back of 1924, it is estimated that in 1917 only about 1,000,000 bushels were produced for seed. In 1924 production had increased to 5,190,000 bushels, and this year about 8,688,000 bushels were gathered.

The yield was from 1 to 3 bushels higher than last year in the commercial area of the North Central States, but correspondingly lower in most of the South, where the crop suffered with the other legumes from unfavorable weather conditions.

Regardless of the fact that production has increased so rapidly, it has not kept pace with the demand and the United States is still a large importer not only of the beans but of the cake and oil, imports of cake and meal for the first nine months of 1928 having amounted to approximately 40,000 short tons.

What Tariff on Oils and Fats?

Analysis of Views of Producers and Refiners As Shown by Replies to a Questionnaire

WHAT does the average producer or refiner of oils and fats think of the proposal made by farm and dairy interests of the United States in recent tariff hearings before the Ways and Means Committee in Washington that a duty of 45 per cent ad valorem be placed on all imported oils and fats, including those from the Philippines?

A questionnaire was recently sent out to all producers and refiners of fats, oils, and edible oil products by *Oil & Fat Industries* in order to secure something akin to an accurate idea of where the industry stood on this tariff question. The response to the questionnaire was both prompt and full, and displayed a keen interest in the question. The replies to the various questions, however, showed a startling diversity of opinion. In some cases, it is difficult to reconcile them with the generally known interests of the companies involved.

In a broad way, the questionnaires showed American crushers of vegetable oils almost six to one in favor of the proposed 45 per cent tariff with those mills located in the South being almost unanimous in favor of the proposal. Refiners of vegetable oils, and manufacturers of margarins, lard compounds, etc., were lined up in the opposite direction. Producers of animal and fish oils showed an almost even division of opinion. Taking all groups as a unit, the replies to the questionnaire showed some 53 per cent in favor of the higher tariff rates and 47 per cent opposed.

Among some of the interesting sidelights revealed by the figures of the questionnaires, was the manner in which the opinions expressed were split up in various sections of the country. Taking all the replies of the different types of manufacturers and checking them up geographically, the Eastern and Northwestern states showed the greatest vote against the proposed tariff. Those who expressed an opinion in favor were only 12½ per cent while 87½ per cent were against. In the West and Mid-West states, 20 per cent were for the proposal and 80 per cent were against. An interpretation of these figures naturally would indicate that they were mostly from refiners of oils, with few vegetable oil producers included among them, and also from manufacturers of lard compounds, cooking and shortening fats and oils, margarins, mayonnaise, and such products. These groups were apparently refiners of oils irrespective of their origin and manufacturers of edible fatty products from refined oils. Their interests lie along lines of not too high prices for crude oils and they apparently see in the heavy imports of oils each year a means of keeping domestic prices of their raw materials from becoming too expensive.

QUESTIONNAIRE

1. Do you favor the proposed increased tariff on fats, oils, etc? .....
2. What is the nature of your business? .....
3. Do you actually produce—1. animal fats, oils or greases ..... 2. vegetable oils ..... 3. fish oils ..... from the basic raw materials?
4. Do you purchase crude oils and refine them? .....
5. Do you refine crude oils of your own production? .....
6. Are your crude oils of domestic origin or imported? .....
7. Do you produce any of the following finished products — (please check) lards .....; lard compounds .....; margarins or oleomargarins .....; salad oils .....; shortening compounds .....; mayonnaise .....; peanut butter .....; other similar products (what ones?) .....
8. Briefly, what effect would the proposed higher tariff rates have on your particular business? .....
9. Do you believe that products from the Philippines should carry import duties? .....
10. What do you believe is an equitable tariff on imported crude oils? .....
    On refined oils? .....
11. Remarks: .....

Tariff Opinions Analyzed Geographically

	% For	% Against
Eastern States	12½%	87½%
West & Mid-West States	20 %	80 %
Southern States	77 %	23 %
Total	53 %	47 %

The South Favors the Tariff

A GEOGRAPHICAL group embracing the South and Southwestern states shows the greatest vote in favor of the proposed tariff. Some 77 per cent of all those who returned questionnaires from these states are in favor of the higher tariff, while 23 per cent are against. This includes cottonseed and peanut oil crushers who are apparently almost wholly for the tariff and many refiners who must buy crude and who are against it. In this connection, it is rather interesting to note the South and Southwest, always looked upon as a Democratic section of the country and advocates of a low tariff, coming out more than three for one in favor of this oil tariff. At the same time, we see the Republican Middle-West and high-tariff Eastern states showing an average of only 16 per cent in favor of the new oil duties and 84 per cent against. Of course, the answer lies in the particular and individual interests involved in each section of the country.

Shall products from the Philippine Islands carry a tariff of 45 per cent? In other words, shall Philippine coconut oil be taxed?

This question brought answers which lined up fairly closely with the expressions on the proposed tariff as a whole. Counting all groups in the oil and fat industries, 44 per cent were in favor and 56 per cent were opposed.

Vegetable oil crushers, as might be expected, voted 72 per cent for a tariff on Philippine coconut oil with 28 against. The refiners, as might also be expected, almost exactly reversed this vote, 36 per cent in favor and 64 against. Animal and fish oil producers voted 60 per cent in favor and 40 per cent against. The consuming groups, if the margarin and similar manufacturers can be called this, voted completely against the proposal.

What Rate of Duty Is Fair?

WHAT is an equitable tariff rate on crude oils, and on refined oils? This question brought some replies in percentages and others in exact figures of so much per pound. The lowest figure suggested for crude oils was 6 per cent, and the highest 50. The average of all questionnaires on this question was 35 per cent. For refined oils, the lowest figure given was 10 per cent and the highest was 80 per cent. The average of all replies was 41.5 per cent. These averages would mean roughly about 2.5c per pound duty on all crude oils and about 3.75c on refined oils.

Oil and Fat Industries is pleased to be able to quote some of the replies to its questionnaire on the tariff situation as given by important members of all branches of the billion-dollar business affected by this situation.

From Cottonseed Crushers in the Southern States

"At the present time cottonseed oil, corn oil, and hog lard are selling much below the relative prices of other commodities. We hear much talk of the need of improving the farmers' situation, and we believe this is one of the first things that should receive the attention of our Congress."

Tariff Opinions Analyzed by Groups

	% For	% Against
Vegetable Oil Crushers	85%	15%
Vegetable Oil Refiners	36%	64%
Animal Oil Producers	50%	50%
Mayonnaise Producers	0	100%
Margarin Producers	0	100%
Miscellaneous	17%	83%
Total	53%	47%

"We believe that the tariff, to be fair to all our land, should lay as low a tariff as is possible to put us at a slight advantage over Europe and the balance of the oil-producing areas."

"Brief containing increases filed with the House Ways and Means Committee by the Southern Tariff Association and others meet with our approval."

"We *know* that protective tariff on vegetable oils is a direct benefit to the cotton raising sections."

"It seems to us that tariff relief is one of the most urgent matters to be considered for the cure of widespread farmer dissatisfaction. We,

Tariff Rates Suggested by Producers

	High	Low	Average
Crude Oils	50%	6%	35%
Refined Oils	80%	10%	41.5%

too, are of the belief that it will help the industry of which we are a part, for the reason that it should eventually open up new supplies of raw materials in the way of oil bearing seeds or nuts, particularly soya beans and peanuts, enabling us to operate over a longer period of time than is possible on cottonseed alone.

"Would help me as a farmer to get a higher price for my cottonseed, but would not help me in my oil mill operations."

"Soap fats might be left on free list, if brought in under bond and used strictly for soapmaking; coconut oils from Philippines might come in same way; but taxed if used for edible use."

"Increased tariff on vegetable oils will help the farmer ultimately in obtaining a fairer price for cottonseed, peanuts, soya beans, etc., produced in the U. S. A., of which the South is a part. The farmers in the South need help. The Farmer feeds us all."

"We figure it would keep price of crude cottonseed oil higher, by reason of keeping imported competitive oils higher. We believe in protecting the home market for home products in all lines where we have the basic materials."

"Our preference for the increased tariff is only to help farmers, as we ourselves would not benefit by it."

"We believe that the proposed increased tariff, if put into effect, will help to stabilize the crude cottonseed oil mill industry."

"Would increase the price of cottonseed oil above a fair parity with hog lard."

From Oil Refiners

"Would enlarge our market and better prices."

"General increase in rates would be very demoralizing."

"There should be no tariff on imported crude oils and a small one, if any, on refined oils."

"We believe in a tariff on the oils but a reduction of the present duties on seeds, nuts and raw materials."

"Very detrimental, for it would force the prices of our finished product above prices of hog lard, if there should be a shortage of domestic oils."

"Would ultimately raise prices and curtail consumption, causing oversupply."

"Would raise the costs of the refined oils directly and of our crude oil indirectly, hence the raw material cost of all our products."

"The proposed higher tariff rates would benefit us, as at present we are suffering from foreign competition on refined edible oil."

"To place a duty on imported oil, in a strong measure, would be materially assisting our farm relief problem."

From Crushers of Other Oils

"This country can produce sufficient oils and fats for its needs if the farmers are properly protected."

"Would reduce consumption and increase competition, a.ready too great between mills."

Analysis of Returns on Philippine Products Tariff

	% For	% Against
Vegetable Oil Crushers	72%	28%
Vegetable Oil Refiners	36%	64%
Animal Oil Producers	60%	40%
Mayonnaise Producers	0	100%
Margarin Producers	0	100%
Miscellaneous	8%	92%
Total	44%	56%

"A duty on Philippine coconut oil would be disastrous to the Philippine coconut oil mills."

"We want copra to remain on the free list from all countries. Free copra from Philippines alone will mean a scramble there for copra and resultant high prices."

From Mayonnaise Manufacturers

"It would probably raise the cost of our mayonnaise and compel us to charge more to the consumer."

"Probably increase the cost of raw material which would necessarily increase the cost of finished product."

"Advance prices—Curtail consumption—Depress business."

(*Turn to Page* 43)

Vegetable Oil Storage Methods

Discussing Types of Tanks Adapted to Particular Storage Problems

By Alan Porter Lee

Modern Seaboard Oil Terminal

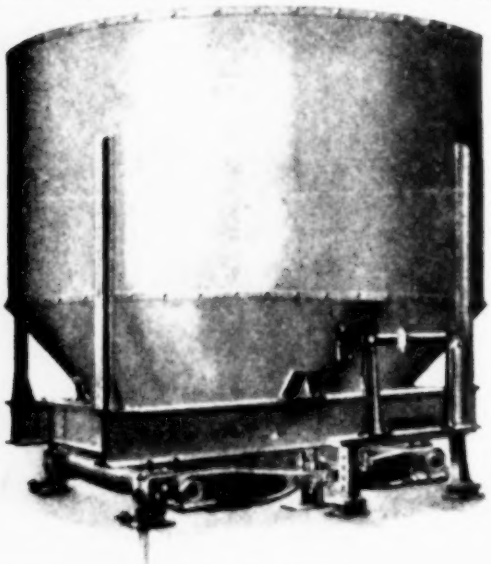
THE storage of fatty oils would appear at first glance to be the simplest factor in the business of manufacturer, importer or dealer in these commodities, but upon examination it is found that experience has shown the necessity for careful planning of storage facilities in order to avoid serious losses from waste, contamination or deterioration.

The requirements of storage installations vary over an extremely wide range, from the largest steel tanks for crude oils, to the smallest container of non-corrosive material for fine edible oils and their derivative products. The materials to be stored include products of the greatest diversity of melting and solidifying points, of viscosity, and of other properties, such as susceptibility to light and air, tendency to deposit sediment or to thicken, inflammability under certain conditions, etc.

Oil Receiving Stations

WE WILL consider first the requirements of a seaboard unloading plant for handling oils received from abroad. These may arrive in ships' tanks, in barrels or drums, or in wooden cases containing one or more tins per case. The grade of oil received is generally crude, but the kind may be any one of a number, including coconut oil, palm kernel oil, olive oil foots, soya bean oil, peanut oil, linseed oil, perilla oil, china wood oil, rapeseed oil, castor oil, whale oil, fish oils and many others. If the oil arrives in barrels or drums it is generally sent on to its ultimate destination without change of package, but if the containers are cased tins, they are usually emptied at the receiving wharf and the contents transferred to storage tanks to be dispatched in tank cars or barrels to the purchaser.

The first requisite then, of an unloading station, is a set of suitable dumping tanks for receiving case oil. These should be located under cover for protection from the weather and equipped with steam coils to facilitate liquefaction of their contents in cold weather. There should be a sufficient number of such tanks in the battery to enable simultaneous dumping of several kinds of case oil without fear of mixing or contamination. Each dumping tank should be provided with a bottom outlet toward which the entire tank bottom



Courtesy The Allbright-Nell Co.

Scale Tank of Steel

should slope and the outlet should have a connection for drainage of water when the tank is being washed out. These dumping tanks are conveniently constructed of steel plates, riveted or welded.

The main storage tanks of the unloading station are generally constructed of sheet steel, riveted *in situ*, and must be of such number and such variety of size as will permit handling oil received in bulk in steamers' tanks as well as that dumped from cases. These storage tanks may be located in the open or under cover. In either case they must be equipped with individual steel covers, manholes in covers and at bottom of shell, ladders inside and out, continuous steam coils and bottom outlets with pump and drain connections. Such tanks are conveniently arranged as shown in the accompanying illustration of a typical seaboard vegetable oil terminal. It will be noted that the tanks, of varying size, are located adjacent to trackage, with tank car loading racks between the tracks and with loading pumps in individual houses between the tanks.

Storage at Oil Mills

THE OIL miller has important storage problems, including those relating to untreated seed, beans, copra; to cake and meal residuals from the pressing operations; as well as oil storage problems. The latter class only will be considered herein.

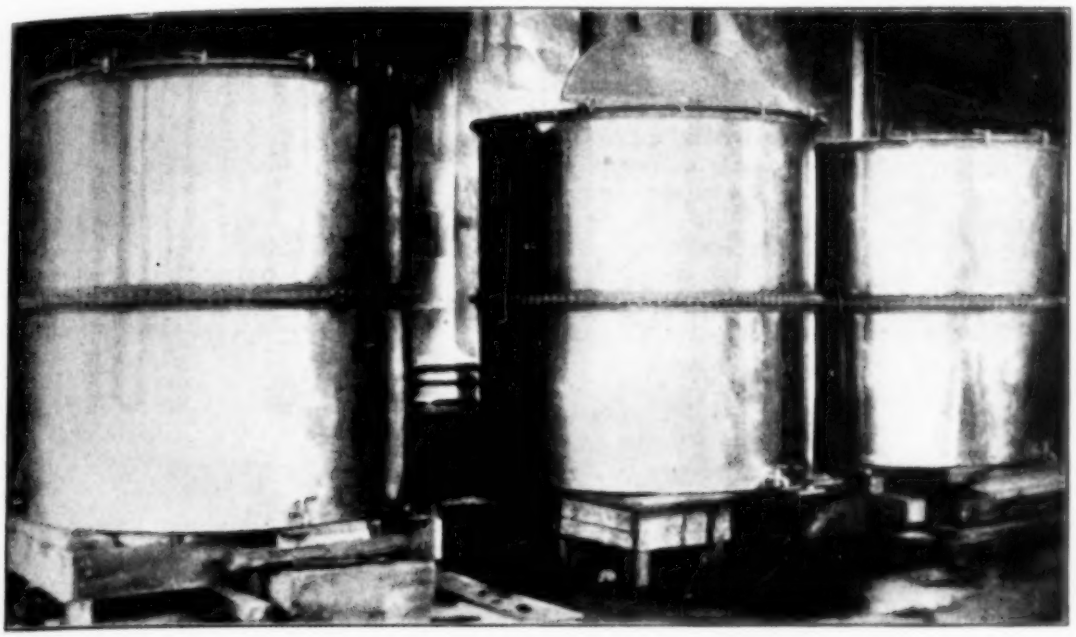
In most mills oil flowing from hydraulic presses, or from expellers, contains more or less sedimentary material (meal and albuminous matter), which must be removed as quickly as possible in order to prevent its fermentation and consequent deterioration of the oil. The general custom is to permit the oil to flow from the presses or expellers by gravity into shallow rectangular tanks of large cross-sectional area. The design of these tanks as affecting size and shape is more important than the material of which they are constructed, the obvious necessity being to obtain as great surface area in proportion to the depth of the tank as the space available will permit. Such tanks are universally constructed of riveted or welded steel plates and should be equipped with movable suction pipes for discharge of contents from any level of the tank, (to facilitate pumping off oil above the sediment level). The tanks should also be provided with bottom cleanout discharges and when the oil is of high melting point or the mill is located in a cold climate, these tanks must be provided with steam heating coils, which should be of the continuous welded flat-coil type.

From the receiving and settling tanks the oil is generally pumped through filter presses into bulk storage tanks of design entirely similar to those used in the seaboard terminal shown in illustration herewith, from which the product may be loaded into tank cars or barrels for shipment.

Oil Refineries

THE OIL refinery employs storage tanks of all varieties in the course of the many and varied operations which come under the head of refining. In many refineries it is the custom to unload tank cars of crude oil directly to the first process tanks, generally neutralizing tanks, in order to prevent deterioration of the crude material prior to refining treatment. In some cases, however, the nature of the crude oil is such that it may be safely stored and in such instances it is frequently unloaded from the tank cars to one or more standard bulk storage tanks to be held for refining as needed.

In any case, one of the refinery's most useful adjunct tanks is the scale tank, as shown in illustration on this page. Such a tank is used



Courtesy International Nickel Co.

Monel Metal Tanks for Storing Fine Oils

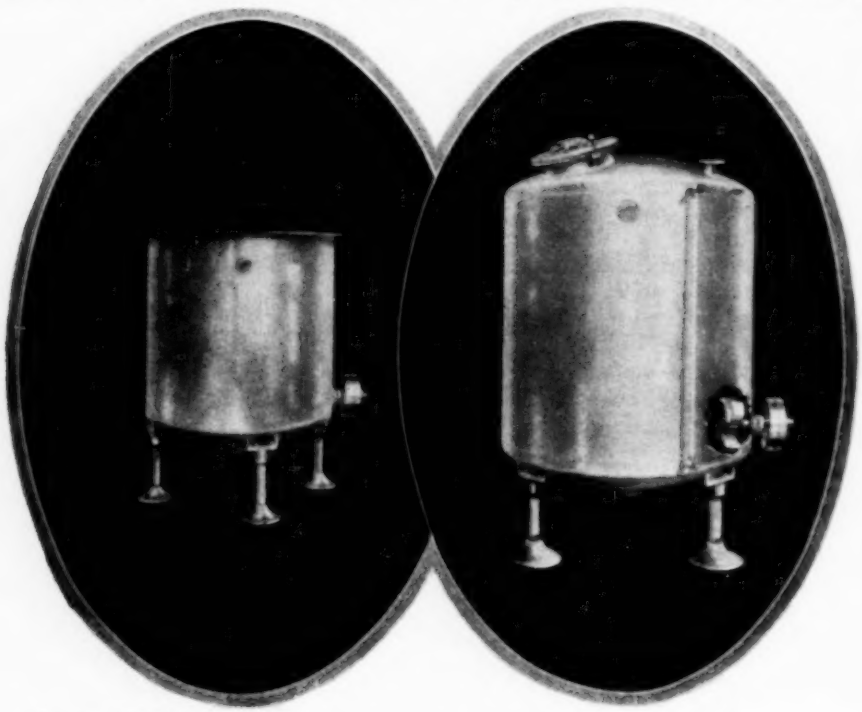
Courtesy Pfaudler Co.

Extensive Battery of Large Glass-lined Storage Tanks for Edible Oils

principally for the weighing of crude oil before refining, but may be adapted to the checking of weights of any intermediate or finished oils.

Intermediate Oil Storage

THE STORAGE of intermediate oil products in most refineries is accomplished with satisfactory facility by the use of steel equipment, with heating coils as needed, and with or without covers, depending upon conditions in each instance. Wherever there is danger of contamination of the tank contents by dust of bleaching materials or of alkali, a cover is imperative. Covers are preferably of steel, as wooden covers absorb oil and oil vapors, thus quickly becoming greasy and unsanitary. Tanks and their covers should be thoroughly protected by exterior painting.



Courtesy Pfaudler Co.

Open and Closed Glass-lined Tanks with Agitators

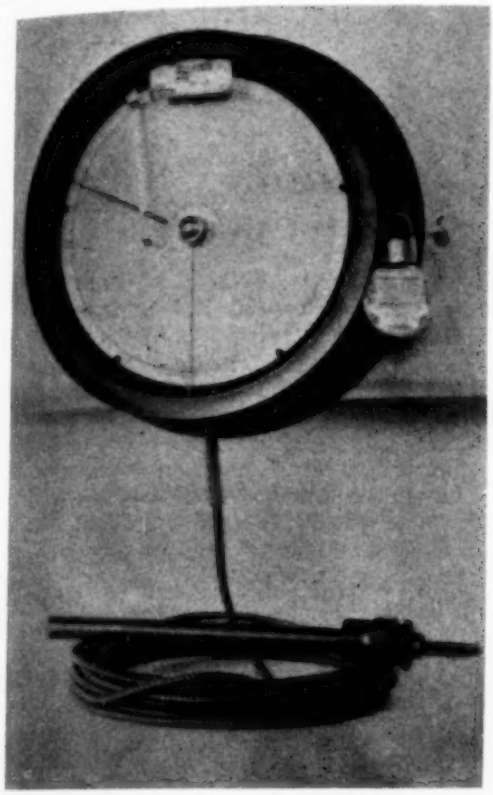
Finished Oils Storage

WHEN the refiner has completed his treating processes he is immediately confronted with the problem of storing his valuable finished products in such way or ways as to avoid contamination or spoilage. Most refined oils, particularly edible oils, are delicate products, particularly susceptible to contamination from unclean containers or from containers made of improper materials. They are also peculiarly subject to damage from foreign odors, being free from odors of their own and exceptionally good absorbents of volatile matters.

Many non-corrosive materials are used in the fabrication of finished oil storage tanks, included among the list of suitable substances being monel metal, homogeneous glass-lined steel, aluminum, nickel, tin-coated steel, and high-chromium alloys of iron, such as ascoloy. All of these materials are suitable for the purpose, the choice of each refiner being dictated by special considerations of cost, availability, superiority for the particular oil to be stored, or personal preference.

A good specification for a finished oil storage tank requires that the tank material be free of any substance which will readily combine with the small traces of free fatty acids in the oil, forming metallic soaps; that the interior surface of the tank be hard, smooth and easily wiped clean, that the tank and its outlets and heating connections are capable of being made tight without the use of objectionable gasket materials or the formation of pockets or recesses which are difficult to keep clean.

Some manufacturers have attained most satisfactory results in the storage of fine edible oils through the use of vacuum, or of the pressure of inert gases, such as nitrogen or carbon dioxide, in the vacant space above the oil in air-tight tanks, thus avoiding any contact of air or of foreign odors with the product.



Courtesy The Foxboro Co.

Recording Tank Thermometer

The oil is filled into packages from such storage tanks by building up increased pressure by means of the inert gas.

Tank Auxiliaries

ANY DISCUSSION of oil storage methods would be incomplete without consideration of the many valuable instruments and accessories by means of which the oil storage terminal, mill or refinery may control the condition and check the amount of oil on hand at all times. Recording thermometers furnish the plant managers with visual records showing that oils have been maintained at proper temperatures day and night, and thermostatically controlled steam valves automatically maintain those proper temperatures. The temperature of oils in storage is of vital importance to all handlers of oils as it is a well known fact that many oils have a tendency to overheat when stored in bulk with serious consequent damage to quality. Recording vacuum and pressure gauges give the desired facts concerning pressure and vacuum storage tanks.

The amount of oil in large storage tanks may be observed at any time, and at any distance from the tanks, by means of distance-reading gauges such as the telegage or pneumercator. The volume delivered into or out of storage tanks is generally measured by means of integrating meters, which are employed thus as a check against scale-tank or track-scale weights.

Derivative Products

IN THE establishments making derived products from oils, such as shortening, mayonnaise, margarine, varnishes, sulfonated oils, etc., the same storage rules must be applied as those used by the oil refiner in relation to his finished oils. The containers must be kept scrupulously clean and must be constructed of such non-corrosive material as will be inert in its reaction to the particular oils and other materials to be handled. They should be so built that cleaning is accomplished with facility and they are subjected to cleansing frequently, daily in most cases. For this reason they are generally planned of such size and number as will most readily fulfill these requirements.

Courtesy Pneumercator Co.

Distance Tank Gauge Electrically Controlled

The Composition of California Walnut Oil

Contribution from Oil, Fat and Wax Laboratory, Bureau of Chemistry and Soils, Department of Agriculture

By George S. Jamieson and Robert S. McKinney

THE manufacture of walnut oil is one of the minor industries of California which utilizes the broken and imperfect kernels of the walnut, *Juglans regia*, separated at the shelling plants. The average oil content of this material is about fifty percent. The oil is obtained by expression and the press cake in mixture with other materials is used for feeding cattle and poultry. At the present time the annual production of oil is about two hundred and fifty tons but in view of the increasing acreage of walnut trees which are beginning to bear it is estimated that the production of oil within five years will be doubled.

The crude walnut oil produced in California is largely used in making soap, but some is used in the manufacture of paints, particularly of the enamel type for which it appears to be well adapted. When refined the oil is suitable for edible purposes.

Walnut oil is a good drying oil and paint films containing it are less liable to crack than those of linseed oil paints. It has been used for centuries in Europe as a paint oil, especially in the preparation of artists' colors.

For the present investigation, a gallon of the crude oil was received at our request from the Pacific Nut Company of Los Angeles, California. The sample was clear and had a deep yellow color when observed in a 6-oz. sample bottle.

The chemical and physical characteristics are given in Table I. The high iodine value of this oil should be observed. Bolton (Oils, Fats, and Fatty Foods, 1928, p. 182) gives the usual limits by the Wijs method as 138 to 148. H. A. Gardner (Pt. and Var. Mfrs.' Assoc. Circ. 189) in 1923 examined a sample of California walnut oil which gave an iodine number of 154.1 by the Hanus method. This result, together with ours, would indicate that the California oil is characterized by having an iodine number much higher than that commonly reported for the European oil. The percentages of saturated and unsaturated acids were determined by the lead-salt-ether method, and corrections were made for the small quantity of unsaturated acids that is precipitated and weighed with the saturated acid fraction **(J. Amer. Chem. Soc. 1920, 42, 2398. Cotton Oil Press 1922, 6, 41). The percentage of unsaturated acids has also been corrected for the unsaponifiable matter that remains with the unsaturated acid fraction.

TABLE I
WALNUT OIL

Chemical and Physical Characteristics	
Specific gravity 25/25°	.9235
Refractive index at 25°	1.4751
Acid Value	5.11
Iodine number (Hanus)	158.5
Iodine number (Wijs)	161.7
Saponification Value	194.5
Acetyl Value	6.09
Reichert-Meissl value	0.11
Polenske No.	0.19
Hexabromide %	8.88
Unsaponifiable matter %	.51
Saturated Acids (corrected) %	5.34
Unsaturated Acid (corrected) %	89.74
Iodine number of Unsat. acids	186.7

Unsaturated Acids.—The linolenic acid was separated and weighed as hexabromide according to the Washburn and Steele procedure **(Ind. Eng. Chem. 1920, 12, 521). The average of two determinations in close agreement was 8.88 percent of hexabromide, which is equivalent to 3.08 percent of linolenic acid in the original oil. After the percentage of linolenic acid has been determined it is possible to calculate the percentages of oleic and linolic acids from the iodine number of the unsaturated fraction, 166.7 and the theoretical iodine number of the three acids; 274.1 for linolenic acid, 181.4 for linolic acid, and 90.1 for oleic acid. In this way the percentage composition of the unsaturated acids tabulated below was calculated.

	Unsat. Acid Fraction %	Unsat. Acids in Oil %	Glycerides of Unsat. Acids %
Linolenic Acid	3.44	3.08	3.2
Linolic Acid	11.74	69.75	72.8
Oleic Acid	18.82	16.91	17.6
	100.00	89.74	93.6

Saturated Acids.—The saturated acids which were separated from the oil by the lead-salt-ether method were esterified with absolute methyl alcohol (J. Amer. Chem. Soc. 1920, 42, 1200), and the resulting esters were fraction-

ally distilled under diminished pressure. The data for the distillation are given in Table II. The preliminary distillation was made from a 500 cc. Claissen flask, which divided the mixture of esters into four fractions and a residue. These were redistilled from a 150 cc. Ladenburg flask according to the manner indicated in the table. Six final fractions and a small residue were obtained.

TABLE II
WALNUT OIL
Fractional Distillation of Methyl Esters of Saturated Acids.
(88.65 g. subjected to distillation)

	Fraction	Temperature °C	Wt. Grs.
Preliminary distillation under 3mm. pressure.	A	171-3	18.7
	B	174-5	21.7
	C	176-8	23.1
	D	185-195	21.0
	Residue		4.0
Final distillation under 2 mm. pressure.			
Fractions A and B added	1	164-6	8.50
	2	167-171	24.25
Fraction C added	3	172	23.70
Fraction D added	4	172-5	19.43
Residue added	5	175-180	7.80
	6	184-194	4.60
	Residue		.22

The iodine numbers and the saponification values of these six final fractions were determined and are recorded in Table III. The small final residue was saponified with alcoholic potash, and the fatty acids were liberated with hydrochloric acid, collected, dried, and crystallized from 10 cc. of alcohol. The crystalline fatty acid (.150 g.), which melted at 74 to 75°, was recrystallized. Then it melted at 77°. Another recrystallization did not change the melting point. Equal quantities of this acid and arachidic acid of known purity were mixed, and the melting point of the mixture was 77°. No other acid could be isolated from the residue. The iodine numbers of the various fractions are the measures of the contaminating unsaturated acids, and from these values the percentage of unsaturated acid esters were calculated. From these percentages and the saponification values the mean molecular weights of the saturated acid esters in the different fractions were calculated. The mean molecular weights indicate what saturated acids may be present in each fraction. For example, the mean molecular weight of the saturated acids esters in fraction 1 (column 5, Table 3) is between methyl myristate (242.3) and methyl palmitate (270.3) and indicates that this fraction contains both of these esters. The result for fraction 2 indicates that it contains only methyl palmitate, whereas the results for fractions 3, 4, 5 and 6 suggest that they contain various proportions of methyl palmitate and stearate (298.4).

In order to test the correctness of these deductions, the free fatty acids were recovered from several of the fractions by saponifying with alcoholic potash, removing the alcohol, dissolving the soaps in water and decomposing them with hydrochloric acid. The constituent saturated acids entirely freed from mineral acid were isolated by fractional crystallization from ethyl alcohol. Their identity was established by determining the melting points and by observing whether or not they were lowered when the substances were mixed with equal quantities of the respective acids which they were suspected of being, the purity of which had been established by analysis.

The deductions drawn from the mean molecular weights were confirmed as follows: Arachidic acid, $C_{20}H_{40}O_2$ melting at 77° was isolated from the residue; Stearic acid, $C_{18}H_{36}O_2$, melting at 69 to 70° was obtained from fractions 5 and 6; Palmitic acid, melting at 63° was obtained from fractions 1, 2 and 3. Twelve crops of crystals were obtained from the alcoholic solution of fraction 1 by gradually reducing the volume of alcohol and finally adding small quantities of water. The melting point of the final very small crop of crystals was about 55°, indicating that it was myristic acid, $C_{14}H_{28}O_2$, which melts at 54 to 55°.

The quantities of saturated acids in the fractions were calculated from the mean molecular weight of their esters and the theoretical molecular weights of the two esters in each fraction. The results are given in Table III:

TABLE III
Results of Analyses of Fractions from Distillation of the Methyl Esters.

Fractions	Iodine Nos.	Sapon. Values	Esters of Unsat. Acids	Mean Molec. Wt. of Esters of Sat. Acids	Myristic Acid %	Myristic Acid G	Palmitic A. %	Palmitic A. G	Stearic Acid %	Stearic Acid G	Arachidic Acid-G
1	3.1	207.7	1.94	269.7	2.01	.171	90.99	7.734			
2	4.6	206.3	2.85	270.3			94.61	22.431			
3	8.6	204.3	5.26	273.2			84.96	19.536	7.43	1.763	
4	11.1	200.1	6.64	279.3			60.12	11.682	28.44	5.526	
5	26.1	197.3	14.21	282.6			45.68	3.563	35.75	2.788	
6	27.8	189.0	15.13	297.2			3.44	.158	77.41	3.561	
Residue											.150
						.171		65.104		13.638	.150

TABLE IV
Walnut Oil
Saturated Acids

Acids	Acids in Sat. Acid Fraction Grams	Per Cent	Acids in Oil Per Cent	Glycerides in Oil Per Cent
Myristic	0.171	.22	.01	trace
Palmitic	65.104	82.34	4.40	4.60
Stearic	13.638	17.25	.92	.95
Arachidic (Residue)	.150	.19	.01	trace
		100.00	5.34	5.56

In Table IV the percentage composition of the saturated acids is given in column 2. These values have been calculated to the basis of the original oil and are given in column 3. Column 4 gives the equivalent percentages of glycerides.

Summary

The chemical and physical characteristics of a sample of oil expressed from California walnuts have been determined. With the exception of the iodine number, the characteristics are similar to those reported for European walnut oil. The unusually high iodine number (161.7) of this sample of oil is noteworthy; the usual limits by the Wijs method are given as 138 to 148. This oil was found to contain 89.7 per cent of unsaturated and 5.3 of saturated acids. Contrary to the repeated statements in the literature, walnut oil does not contain lauric acid and only a trace of myristic acid, which is in accordance with the saponification value (192 to 197) of the oil. The percentages of the fatty acids as glycerides are given below:

The composition of this oil has been determined, with the following results:

Glycerides of:	Per cent
Oleic acid	17.6
Linolic acid	72.8
Linolenic acid	3.2
Myristic acid	trace
Palmitic acid	4.6
Stearic acid	.9
Arachidic acid	trace
Unsaponifiable matter	.5

Mayonnaise Standard Interpreted

In reply to a letter addressed to the United States Department of Agriculture by Mr. Frank Honicker, Executive Secretary of the Mayonnaise Products Manufacturers' Association, the Assistant Chief of the Food, Drug and Insecticide Administration has given an interpretation of the mayonnaise standard and definition recently published by the Department. The letter as received by Mr. Honicker follows:

UNITED STATES DEPT. OF AGRICULTURE
FOOD, DRUG AND INSECTICIDE ADMINISTRATION
Washington, D. C.
January 22, 1929.

Mr. Frank Honicker,
Executive Secretary,
Mayonnaise Products Mfrs. Assn. of America,
505 Bulletin Building,
Philadelphia, Penna.

Dear Sir:

This will acknowledge receipt of your letter of January 7 in which you submit certain inquiries on behalf of your association with reference to the definition and standard for mayonnaise. You inquire what is meant by the term "semi-solid."

The term "semi-solid" may be given its ordinary, or dictionary, meaning, e.g., half solid, part solid, partially solid, almost solid, or incompletely solid, so viscous as to be nearly solid. Obviously, it is not possible to fix hard and fast limits for the variations in consistency or firmness of emulsions which a consumer is entitled to expect in a product sold as mayonnaise.

Mayonnaise should have a consistency such that it will not flow readily from a bottle and that it will retain its shape to a degree when removed from the package and for a time sufficiently long to admit of its use for the purpose to which this type of salad dressing is commonly applied.

The definition has been adopted and was published in the form of a press notice on November 15, 1928. It contains no provisions for the use of fillers or so-called stabilizers. Substances, such as starch, may be added to mayonnaise, provided they are wholesome food products and their use does not conceal damage or inferiority, and, provided further, the principal label carries a plain and conspicuous declaration of the presence of the added substance printed in connection with the name of the product. Products which fail to meet the requirements of the standard should not be sold as mayonnaise.

The definition and standard became effective upon its publication and no date has been specified after which it will be put in force. Manufacturers are expected to conform to its requirements as promptly as possible.

Very truly yours,
(Signed) P. B. DUNBAR,
Assistant Chief.

The Consumers' Side of the Tariff

The Argument Against the Higher Duties as Given from the Angle of the User of Technical and Non-Edible Oils

By John B. Gordon

Bureau Raw Materials, Vegetable Oil & Fat Industries

PERSONS claiming to represent dairy, livestock and general farming interests, are appearing before the Ways and Means Committee at Washington and asking for a straight 45 percent ad valorem tariff on vegetable oils and fats. What can the dairyman, the livestockman or the general farmer hope to gain by such a plan? Before rushing blindly into a tariff program of this kind affecting oils and fats, farmers and farm leaders would do well to consider the following facts:

A tariff on vegetable oils and fats cannot be of material benefit to livestock producers or growers of grains and feed crops. The prices of those crops consumed mostly by livestock tend, in the long run, to follow livestock prices. Tariffs on livestock may help, but certainly there is no reason to expect any enhancement of livestock and grain prices by placing duties on vegetable oils and fats. Furthermore, so long as we continue to export a large proportion of our lard—717,000,000 pounds in 1927—the foreign price of lard must determine our home price and tariffs can not help. Some advocates of high tariffs on vegetable oils argue that by making oil prices higher the cost of lard substitutes would be increased and this would raise the price of lard. It must be self evident, however, that the price of lard determines the price of lard substitute rather than the reverse. Lard substitutes are priced just enough under the price of lard to make them attractive to the buyer. If the price of vegetable oils going into the manufacture of lard substitutes were to be raised by any artificial condition, the possible margin of profit would be reduced and some lard substitute producers driven out of business, but this could have no effect in raising lard prices. Lard prices would still be set by the foreign markets which take our large exportable surpluses.

In the case of dairy products the situation is a little different. We do not have an exportable surplus of butter. Butter prices are now receiving the full benefit of the tariff. Butter substitute prices follow along just far enough below butter prices to appeal to a certain percentage of consumers. By making vegetable oil prices higher, the present differences in price between butter and butter substitute would be reduced and some present consumers of the cheaper product might be willing to pay the prices demanded for butter and this increased butter consumption might have a slight tendency to raise butter prices. But this effect would be small even if a tariff on oils could be made fully effective.

Dairy Interests Riding for a Fall

DAIRY interests are riding for a fall if they think it will be possible to persuade our government to withdraw the free trade principle from our island possessions, for many reasons too numerous to discuss here. Such action so harshly demanded by some of the farm representatives would ruin the Philippine trade and would precipitate the demand for Philippine independence, a move that could not be made at this time without great loss to large American investments in the Philippines. Sometimes spokesmen at Washington claiming to represent dairy interests, shift the basis of their argument and say that they are interested principally in encouraging the home production of vegetable oils here in the United States.

Several fairly obvious points must be considered in this connection.

First: Cottonseed oil production would not be increased by this means (even assuming that Philippine oils were excluded). No farmer grows cotton for the cottonseed oil. This is purely a by-product. Any slight increase in the price received for a bale of cotton because of a higher price for oil, would not be noticeable to the average farmer and would be no incentive to increase cotton planting. Besides, the effort today in cotton and government cooperative circles is to discourage increased cotton acreage. Cotton cooperatives would like to see cotton acreage reduced rather than increased because there is too much cotton lint produced.

Second: Soya bean oil is the oil usually mentioned by farm leaders when questioned as to just where increased home production is to take place. But it must not be forgotten that

every time a ton of soya bean oil is produced, 7.2 tons of oil cake are also produced. Soya beans yield only 10.25 per cent oil and 73.63 per cent goes into cake. Unless a satisfactory market can be found for this cake the production of soya beans cannot expand extensively. This finding of a satisfactory market for soya bean cake would be difficult because soya bean cake and meal would be in competition with the products of every farmer who grows feeds. It would be in direct competition with the southern farmer's cottonseed meal. It would be in direct competition also with bran, alfalfa meal, flaxseed meal, and all the other high protein feeds.

Flaxseed is often mentioned as a farm product that could be more extensively grown because of the demand for linseed oil required in paints. Granting that this be true, linseed oil and soya bean oil are classed as "drying oils" and cannot be replaced by such oils as cocoanut oil, palm oil, palm kernel oil, etc. Linseed oil and soya bean oil are adequately protected by the proposed tariffs, but as already pointed out, the chances for important expansion in the production of soya beans for use by oil mills would have exceedingly hard sledding because of the cake marketing problem.

Third: Since we do not at present grow enough vegetable oils in the United States mainland to supply the demand even for edible oils used in butter substitutes and lard substitute, the stand taken by farm leaders is equivalent to a demand that manufacturers of soap, varnish, tin plate, and other industrial users be forced to use oils now being used for the higher edible purposes. In other words, some of these farm leaders are demanding that higher prices be paid for oils for industrial uses (in an effort to raise prices on edible oils) even though farmers of the United States are not producing the oils needed for these industrial uses.

For illustration: Varnish manufacturers use China wood oil principally. This oil cannot be used in foods; it has a poisonous effect when taken into the stomach. Being forced to pay a 45 per cent duty on China wood oil would have no other effect than to raise the retail price of varnish by perhaps 50 per cent. Producers of the newer cellulose lacquers may be interested in getting this duty on China wood oil in order to plague their rivals, but why should dairy and farm interests help in this raid?

What the Oils Tariff Would Cost

THE farmer is a consumer as well as a producer. He needs to weigh carefully the relative benefits and disadvantages of any proposed tariff. Some agricultural tariffs are of undoubted benefit. The tariff on dairy products is one of the most notable of this class. Other tariffs are merely useless. But the proposed indiscriminate tariff of 45 per cent ad valorem on all vegetable oils and fats, is worse than useless. It would work a positive injury to nearly all classes of farmers and would fail utterly to accomplish any material benefits for its chief backers — spokesmen claiming to represent the dairy groups.

Imported inedible oils and fats enter into a surprisingly large number of articles of common use and are required in a large number of industries. In addition to the better known uses such as for soaps, paints, varnish, linoleum, etc., large quantities are used by tanners in finishing leather; by textile mills both in finishing and in washing fabrics and by steel mills for finishing tin plate. Every leather belt and every piece of harness requires dressing with oil mixtures; much machinery, including automobiles, is lubricated by vegetable oils; and the priest burns imported rape seed oil in his sanctuary lamp.

The increase in prices of manufactured articles that would be necessary if an effective tariff were imposed on inedible vegetable oils would vary, of course, according to the percentage of oil contained. A 45 per cent ad valorem tariff would cause a 50 per cent increase in the selling price of many kinds of soap for instance.

Fish oil producers on the Atlantic coast are working under the farm banner to get a high tariff on vegetable oils. They see a chance to force paint makers, tanners, and soap manufacturers to use fish oil at higher prices. That is good business for the fish oil people, perhaps, but where does the farmer get off who must buy the higher priced paints, harness and other leather articles, soaps, and numerous other products?

Denaturation?

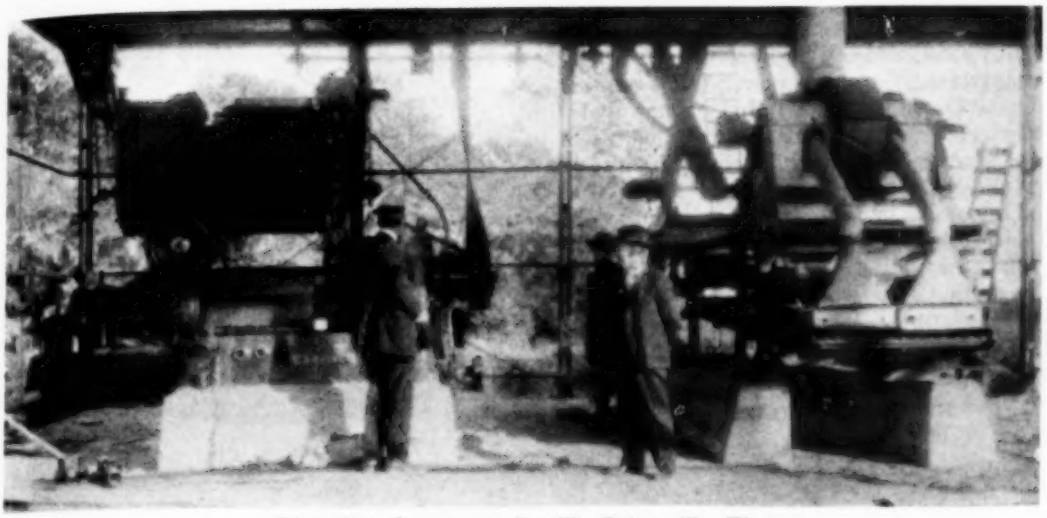
AFTER long and careful study of the equities of the case the industrial users of oils and fats propose a solution which should be acceptable to all sincere and legitimate farm representatives. This solution has the added merit of being very simple and easy to apply. Users of oils for industrial purposes propose that all questions as to interchangeability of oils (a badly misunderstood expression) be removed, so far as imported oils are concerned, by denaturizing. That is, all oils that are to be brought in for industrial purposes would be required to be treated, under Federal supervision, with a substance that will render them unfit for food. This plan of denaturizing low grade olive oils to keep them from going into

(*Turn to Page* 43)

American Tung Oil Production

First Commercial Unit for Manufacture of This High Grade Varnish Oil Established in Florida

By FRANCIS COOPER



First American tung oil mill—Gainesville, Fla.

THE world's first mill to employ power in the production of tung oil (China wood oil), has recently been completed at Gainesville, Florida, to handle the 1928 and future crops of tung oil nuts from the plantations of the Alachua Tung Oil Corporation and the American Tung Oil Company. The trees on the properties of these companies have just come into bearing, consequently the managements have deemed it advisable to install crushing equipment this winter.

Tung oil, as is well known to many of our readers, is used in the manufacture of high quality waterproof paints and spar varnishes, and is also extensively employed in the manufacture of linoleum. Until this year the only sources of supply have been interior points in China, with the exception of small quantities of a slightly different grade produced in Japan.

The quality of the oil imported into the United States from China has always been variable, because of very unsatisfactory conditions of production at the different points of origin in the latter country. During recent years an effort has been made to establish cultivation of the Chinese wood oil tree (*Aleurites Cordata*) in America, and the plant has been tested at a large number of points in the Southern United States, and in California. It seems to thrive best in the interior of Florida, near Gainesville, through Western Florida, and on the Southern coastal plains of Georgia, Alabama, Mississippi, and Louisiana. There are approximately four thousand acres of the trees now under cultivation in these areas.

From the photograph published herewith it will be seen that the layout of this pioneer tung oil crushing mill is extremely compact, and that the machinery consists entirely of equipment well known to all American oil millers, with only slight modification. The shelling and separating machinery, shown on the right in the cut, consists of a hopper for receiving the whole dried nuts, a rotary decorticator, shaking separating screens and air-suction hull-conveyors. In operation the whole unshelled nuts are fed by an elevating conveyor into a hopper above the decorticator, which removes the shells, permitting kernels and shells to fall by gravity onto the shaking screen below, from which the hulls are removed by the air-suction conveyor to the fuel-pile outside the mill-building. These shells or hulls constitute the plant's chief source of fuel.

The kernels are conveyed from the separating screen to a set of cracking rolls (not shown in the cut) where they are rolled just sufficiently for efficient expelling of the oil, and are then conveyed to the tempering apparatus above the expeller. The expeller, shown on the left in the photograph, is the latest type Anderson, belt drive, equipped with tempering

conveyor and all latest improvements. The cracked kernels are subjected to slight heating only in the tempering apparatus, with the result that the tung oil produced in this equipment is practically a cold pressed oil, and is lighter in color and higher in quality than any of the Chinese grades. As usual in expeller operation, the broken expeller cake is automatically conveyed to grinding and sacking machinery, for sale as meal, and the oil flows by gravity to receiving tanks for subsequent filtration and shipment. Obviously, the initial capacity of this one-expeller mill is small, but the plant will be expanded as more of the trees come into bearing and the crop increases.

This small but modern mill is in vivid contrast with the type usually encountered in China, the native habitat of the tung oil tree. There the China wood oil crusher, who is usually the farmer who owns a few trees only, first hollows out a log to form a roughly rectangular trough, which he then divides into two compartments by means of a plank placed on edge lengthwise. After filling one of the compartments with the shelled tung oil nuts, he drives wedges into the other compartment of the hollowed log, thus forcing the dividing plank against the nuts and obtaining the oil from them by the pressure set up between the plank and the other side of the hollow log. This very crude method, naturally, does not remove all the oil from the seeds and that produced is often of very inferior quality.

The dedication of the new American crushing plant was attended by several prominent paint and varnish officials, who expressed themselves as gratified at the progress shown toward the establishment of an American supply of tung oil.

McCormick & Co. Sales Convention

At the recent bi-annual sales convention of McCormick & Company, manufacturers of mayonnaise and distributors of a full line of flavoring extracts, teas and spices, held at the company's headquarters in Baltimore, there were one hundred and fifty of the sales representatives present, representing territories stretching from coast to coast.

The week's activities included addresses by the Mayor of Baltimore, W. M. McCormick, President of the company, F. W. Ensey, Advertising Director, George F. Mitchell, Supervising Tea Examiner of the United States, and H. P. Warwick of Cecil, Warwick and Cecil, Advertising, New York. The week's meetings were interspersed with several entertainments which afforded the members of the firm and house organization the opportunity of fraternizing with those who represent McCormick & Company in the field.

Production of pilchard oil in British Columbia is reported as follows in a recent dispatch from American Consul Harold E. Tewell, Vancouver, B. C.:

		Oil	Meal
1928	23 plants	3,966,970 gals.	14,473 tons
1927	19 plants	2,666,948 gals.	12,319 tons
1926	15 plants	1,898,721 gals.	8,481 tons

The A. W. Dodd Company, of Gloucester, Mass., is planning to establish a branch plant for the manufacture of medicinal cod liver oil at Yarmouth, Nova Scotia, according to the Department of Colonization and Development of the Canadian Pacific Railway, who state that the establishment of this plant will no doubt prove a benefit to Yarmouth.

Method for Wool Oil Unsaponifiables

By Leslie Hart

Insecticide Chemist, Chicago Station, United States Food, Drug, and Insecticide Administration

WOOL greases and wool grease soaps are occasionally used as emulsifiers in emulsions of hydrocarbon oils sold for insecticidal purposes. Wool greases sometimes are adulterated with lubricating oil. Wool fat is not completely saponified by alcoholic potash solution, hence the usual method of determining mineral oils in the presence of fatty oils leads to high results, due to the inclusion of higher alcohols (cholesterol, ceryl alcohol, etc.) which are normal constituents of wool fat, in the unsaponified residue. Saponification in a pressure flask by a solution of metallic sodium in absolute alcohol, which has been recommended, is too tedious for a routine method of analysis.

The method described in this paper directs a preliminary treatment with alcoholic potash solution, if the sample is not already saponified, to separate the bulk of the fatty oils from the mineral oils. The residue from this treatment is purified by the use of ethyl-amyl alcohol mixture or by acetylation with acetic anhydride.

If the sample is a soap emulsion, weigh a portion sufficient to give 10 cc. of unsaponified oils, extract twice with 50 cc. and 30 cc. of ethyl ether, adding 1 to 2 cc. of 50 per cent sodium hydroxide solution to break the emulsion. As the mixture emulsifies readily, avoid too vigorous agitation. The ether extracts hydrocarbon oils, ceryl alcohol, etc., and small quantities of soap. Wash the extract with 10 per cent alcohol and 2 per cent sodium hydroxide solution until free of soaps. At this stage washing with pure water will form an emulsion which is difficult to break. Wash the combined alkaline and alcoholic layers successively with 2 portions of ether of 50 cc. each. Combine the ether extracts, evaporate the ether from the solution placed in a tared beaker and weigh the residue. Determine its specific gravity.

If the product under examination is a wool grease, weigh a portion sufficient to give 10 cc. of unsaponified oil, saponify in the usual way with alcoholic potash, evaporate off most of the alcohol on the steam bath, add 100 cc. water and evaporate to 50 cc. Cool the solution and transfer to a separatory funnel. Rinse out the saponification flask with 25 cc. ether and add to the separatory funnel. From this point, proceed as given in the directions for soap emulsions. This preliminary saponification separates most of the fatty material from the hydrocarbons.

A close approximation of the quantity of hydrocarbon oils may be made by treating 10 cc. of the extracted oils with a mixture of 1 part amyl alcohol and 2 parts ethyl alcohol, using 40 cc. (adding from a buret). Place the mixture in a graduated cylinder, reading to 0.1 cc. Shake the mixture. The alcohols, etc., dissolve, and the hydrocarbons separate. Note the quantity of oils and determine the gravity and initial boiling point. Calculate percentage by weight, based on original sample.

A check on this determination may be made on the unsaponified material present in the sample or obtained after saponification with alcoholic potash or with metallic sodium and absolute alcohol. Determine the specific gravity of the unsaponifiable material, and pipet 10 cc. into a 50 or 100 cc. Florence or round-bottomed flask. Add twice its weight of acetic anhydride, connect with a reflux condenser, and boil for half an hour. Pour the acetylated mixture while hot, into a warmed small separatory funnel, rinsing the flask with the smallest possible quantity of acetic anhydride. If two layers separate from the hot liquid, hydrocarbon oils are present. If the solution is homogeneous, but crystals separate on cooling, cholesterol and higher alcohols, and no hydrocarbon oils, are present. As cholesterol is a normal constituent of wool fat, the solution must be kept warm during separation of the two layers, to avoid crystallization. Run off the lower layer into a small beaker, and save for tests for cholesterol, if necessary. Wash the portion left in the funnel once with a little acetic anhydride. If too much be used, notable quantities of hydrocarbon oils are dissolved. Wash the separated oils with hot water, and transfer them to a Babcock bottle. Wash the funnel with cold water, adding the washings to the Babcock bottle. Fill up to the graduations with cold water, allow to stand until oils separate in a clear layer, or centrifuge a few minutes, and note the number of cubic centimeters of the separated oils. Determine their specific gravity and calculate percentage by weight, based on the original sample.

As hydrocarbon oils are normally found in a distilled wool grease, caution should be exercised in reporting the oils thus found as mineral oils, added to the sample.

Notes of the Industry

Spencer Kellogg Expands N.Y. Office

The personnel of Spencer Kellogg & Sons' New York office has been increased considerably during the last few months. J. Ed. Jones, formerly American Linseed Co. Chicago manager, is now with the Kellogg company in New York and Fred J. Werner, former sales manager of Kelloggs & Miller, Amsterdam, is in charge of flaxseed and oil meal sales. W. H. McIntyre is the technical sales representative covering the eastern section of the country, and W. A. Weissman and W. F. Millman, both formerly with the American Linseed Co., are sales representatives covering the metropolitan district. S. Glasser, Jr., assistant district sales manager, has been connected with the New York office for nineteen years and is in charge of cocoanut and castor oil sales. R. C. Boggess is district sales manager.

Chemical Industries Exposition

During the last half century the Chemical Industry has grown until today its products are used by almost every industry, with some of the world's greatest discoveries and achievements to its credit. Vast amounts yearly are spent for research in this field and the benefits derived by mankind are beyond reckoning in a monetary way. Each of the many allied branches of this great industry have developed some of the most useful and necessary of today's products both from a standpoint of necessity and of luxury. Through the efforts of the chemists and chemical engineers labor saving devices have been produced, by-products developed from waste materials which have meant the savings of millions of dollars and labor to mankind.

It is because of the far-sightedness of the leaders of the Chemical Industries that the industry will be represented at the Twelfth Exposition of Chemical Industries at Grand Central Palace, New York City, May 6th to 11th, 1929. This Exposition will bring together chemists, engineers, and manufacturers from over forty industries which are dependent in their operations upon chemical changes in the nature of material, or are under chemical control.

The interest in the Exposition at this early date already indicates that it will be the biggest Exposition ever held by the Allied Chemical Industries. One of the most important features of the Exposition will be Export Day, Thursday, May 9th. All exhibitors will have representatives at their displays to discuss in an intelligent manner all problems pertaining to export of the various commodities that will be exhibited.

Lard Stocks Near Record

A special dispatch to the *New York Times* states that lard stocks in Chicago were 73,126,000 pounds as of January 31, of which 61,216,000 pounds were new. The increase of 39,167,000 pounds last month is probably the largest accumulation ever made at one time. Stocks a year ago were 33,626,000 pounds.

Present stocks are the largest on record with the exception of January 31, 1926, when they were slightly above 82,000,000 pounds. Stocks at all Western points are 92,141,000 pounds, an increase for the month of 44,169,000 pounds. A year ago these holdings were 48,042,000 pounds.

British Linseed Oil Trade

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces the following figures covering British import and export trade in linseed oil during the first eleven months of 1928, with comparative figures for the corresponding period of 1927, and for the full years of 1927 and 1926, respectively.

	11 months 1928	11 months 1927	1927	1926
	Tons	Tons	Tons	Tons
IMPORTS				
Linseed oil	20,612	19,390	22,019	14,291
EXPORTS				
Linseed oil	19,975	18,341	19,923	22,918

Specifications for lard substitutes have recently been issued by Federal Specifications Board, as of January 25, to replace those of March 1, 1926. They are known as specification No. 603B, and become mandatory for the army, navy and marine corps on April 25. The specifications follow: type A, a product prepared without oleostearin; type B, a product prepared with not less than 15% of oleostearin; type C, a product prepared with not less than 20% pf. oleostearin.

Wilson & Co. Gains

Wilson & Co., Inc., has issued its consolidated statement covering operations during the fiscal year ended Oct. 27, 1928, the third for the company as at present constituted, and revealing considerable improvement in its business over the previous 12 months. During the year the company's gross earnings of $5,838,272 resulted in a profit of $2,207,876 after charging off $1,717,011 for depreciation and $1,913,384 for interest, including minority stockholders portion of earnings. The statement showed a total surplus of $4,525,593 as of Oct. 27, 1928.

The consolidated balance sheet as of Oct. 27 last shows the company to be in a strong financial position, current assets of $45,486,950 being nearly nine times current liabilities. Working capital stood at $40,266,027. Of the current assets, the company reported cash of $5,521,648, which item included $497,939 in bankers' acceptances, accounts receivable of $14,578,900 and inventories of $25,386,401, figured at the market, less distributing and selling expense.

Wood Oil Imports Increase

Exports of China wood oil from Hankow to the United States during the month of December amounted to 6,869,555 pounds, compared with 3,845,765 pounds in the preceding month and 5,173,245 pounds in December, 1927, according to a cable received in the chemical division of the Department of Commerce from the American consul at Hankow. Shipments to Europe during the month totaled 3,107,720 pounds, compared with 2,747,360 pounds in November and 2,108,645 pounds in December, 1927. The unsold stocks of wood oil at Hankow on December 31 were estimated at approximately 300 tons.

Margarin Gains In Europe

General meetings of shareholders of N. V. Margarine Unie and Margarine Union Limited will be held on Jan. 30 to vote on capital increases for both companies, according to advices cabled from London. The directors of N. V. Margarine Unie have proposed an increase in authorized capital to 350,000,000 florins, of which 100,000,000 florins are to be preference and the balance ordinary shares.

The nominal capital of Margarine Union Limited is to be increased to £4,100,000 of which £1,500,000 are to be preference shares, £2,500,000 ordinary shares and £100,000 6 per cent deferred shares.

Fortmeyer Re-elected

At the annual meeting of the Linseed Association of New York held in December at the Downtown Association, George W. Fortmeyer was re-elected president for the twenty-sixth time. Mr. Fortmeyer has been unable to attend for several years because of ill health; but the members continue him in office as a tribute to his importance in the industry.

H. G. O. Dunham and George W. Marsh were re-elected vice-presidents, and Thomas J. Hastings was returned to the office of secretary and treasurer.

E. J. Cornish, president of the National Lead Co., addressed the meeting, speaking on current events and giving an interesting summary of market conditions and financial reactions. The Association, which was born in 1867, is said to be the oldest trade club in the United States.

A fifty percent increase in the duty of imported peanuts was ordered by President Coolidge on Jan. 19. The new rates which go into effect Feb. 19, are as follows: Unshelled peanuts, 4½c lb.; shelled peanuts, 6c lb. Domestic growers had previously requested a 59% increase in the duty.

Margarin production for December, 1928, is reported by United States Bureau of Internal Revenue as follows:

	Dec., 1928	Dec., 1927
Uncolored margarin	27,324,690 lbs.	26,035.869 lbs.
Colored margarin	1,574,700 lbs.	1,425,082 lbs.
Totals	28,899,390 lbs.	27,460,951 lbs.

The P. H. & F. M. Roots Company of Connersville, Indiana, has just issued a new 16-page bulletin, Number 33-B1, on High Pressure Type Rotary Gas Pumps. The bulletin gives complete tabulated data on pressures, capacities and horsepowers, a brief review of various types of pumping units, and a comprehensive two-page construction drawing showing the typical unit in detail. The bulletin is so constructed to make it a valuable addition to the large Roots Catalog covering Pumps, Meters and Blowers.

Teaseed oil can be imported into United States free of duty, as a nut oil, under paragraph 1632 of the tariff act, according to a recent Customs Court decision. The oil had previously been classed under paragraph 54, at 20% ad valorem, until protest by Balfour, Guthrie & Co., San Francisco, brought the matter to the Customs Court.

RECENT PATENTS

Fatty acids, such as oleic acids, acids from coconut oil, peanut oil, animal fats or oils, or mixtures of fatty oils or fatty acids and mineral oils, are made soluble in water by a treatment with alkali hypochlorites alone. The products find application in the textile industry for purifying raw fibers, and in general industry for cleaning paint, varnishes, etc. Fr. Patent No. 637,274.

Oils or fatty substances of vegetable or animal origin are bleached by the conjoint use of inorganic oxidizing agents such as permanganate, chlorate or hypochlorite, and inorganic substances acting by reduction or adsorption, such as nascent hydrogen or bleaching earths. The material may be preliminarily treated with concentrated sulfuric acid or made into an emulsion with soap and during the bleaching an amount of acid at least equivalent to the alkali in the oxidizing agent used is added. After bleaching the material may be converted into soap and bleached with hypochlorite. Br. Patent No. 286,794.

Mixtures of fatty substances (such as castor oil or wool olein) with mineral oils, lactones, alcohols, ketones, aliphatic or aromatic acids, hydroxy acids, keto acids, acid anhydrides or acid chlorides are sulfonated by the use of strong sulfonating agents such as chlorosulfonic acid to obtain products which may be used as emulsifying agents, wetting or fatting agents or in cleaning or dyeing paper, textile fabrics, leather, etc., or bleaching, mercerizing, carbonizing or finishing operations. Br. Patent No. 288,126.

Fats, or oleic or other aliphatic acids are aralkylated by treating the materials, which must be of unsaturated character, with benzyl chloride or other aralkyl halide, preferably in the presence of a catalyst such as iron powder, zinc chloride or aluminum chloride. Substances suitable for use as wetting agents in dyeing and as substitutes for Turkey red oil are obtained when these aralkylated products are sulfonated. Br. Patent No. 286,796.

The residues obtained in purifying wool wash waters may be made to yield fatty substances by washing the residues in tepid water and boiling to dryness in the presence of sodium carbonate heating under pressure to allow the impurities to precipitate to the bottom, then decanting and again boiling in water. Fr. Patent No. 638,739.

French patent 643,672 describes a device for cleaning soap kettles while drawing off the lye, thus economizing time and labor. The device consists of a rotary vertical shaft carrying a metal arm to which are attached a series of chains. These chains dredge the bottom of the kettle while the lye is being drawn off.

French patent 641,584, granted to Hertog and Hamon, Aug. 7, 1928, applies to a process for inlaying wax, stearine, fat, tallow, paraffin, cetin, etc., in soap cakes, in such a way as to form words or designs.

U. S. Patents

No. 1,683,677, FILLING MECHANISM, Patented September 11, 1928 by James Kantor, Otto W. Fick and William James Traxel of Chicago, Illinois, assignors to Liquid Carbonic Co., Chicago, Illinois, a Corporation of Illinois. In a machine for filling with liquid, bottles containing air under pressure, a filling mechanism comprising an air pressure tank, a cover for said tank having an air passageway therein communicating with each of the bottles and a centrally disposed opening, a valve stem having an air inlet and an air outlet and extending through said opening, said valve stem being held against rotation with respect to said cover, means communicaing with said air outlet and disposed in said tank for communicating with the air passageways in said cover for cutting off the air pressure in said tank from the bottles and for allowing a portion of the air in the bottles to pass into the atmosphere and means disposed adjacent said air outlet for varying the amount of air passing therefrom.

Fat and Oil Data for Fourth Quarter 1928

Production, Consumption, Exports and Imports With Factory and Warehouse Stocks December 31, 1928

THE Department of Commerce announces that the factory production of fats and oils (exclusive of refined oil and derivatives) during the three-month period ended December 31, 1928, was as follows: Vegetable oils, 1,125,298,523 pounds; fish oils, 21,155,818 pounds; animal fats, 530,384,614 pounds and greases, 94,950,210 pounds; a total of 1,821,789,165 pounds. Of the several kinds of fats and oils covered by this inquiry, the greatest production, 772,808,043 pounds appears for cottonseed oil. Next in order is lard with 469,753,434 pounds; linseed oil with 206,273,130 pounds; tallow with 109,052,212 pounds, coconut oil with 88,119,594 pounds and corn oil with 32,736,618 pounds.

The production of refined oils during the period was as follows: Cottonseed, 645,352,369 pounds; coconut 86,155,552 pounds; peanut, 2,624,036 pounds; corn, 28,873,563 pounds; soya-bean, 1,554,110 pounds; and palm-kernel, 4,781,489 pounds. The quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

The data for the factory production, factory consumption, imports, exports, and factory and warehouse stocks of fats and oils and for the raw materials used in the production of vegetable oils for the three-month period appear in the following statements:

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS

(Where products were made by a continuous process, the intermediate products were not reported.)

KIND	Factory operations for the quarter ended Dec. 31, 1928 Production (pounds)	Consumption (pounds)	Factory and Ware'se stocks Dec. 31, 1928 (pounds)
VEGETABLE OILS:[1]			
Cottonseed, crude	772,808,043	698,801,104	133,836,969
Cottonseed, refined	645,352,360	319,289,527	431,693,697
Peanut, virgin and crude	3,569,061	3,273,185	1,539,461
Peanut, refined	2,624,036	2,628,937	1,487,841
Coconut, or copra, crude	88,119,594	156,654,851	101,602,024
Coconut, or copra, refined	86,155,552	75,083,597	14,444,990
Corn, crude	32,736,618	36,879,378	16,547,885
Corn, refined	28,873,563	4,337,222	11,157,229
Soya-bean, crude	1,506,338	3,324,438	4,574,037
Soya-bean, refined	1,554,110	843,275	1,410,284
Olive, edible	385.253	493,833	3,863,841
Olive, inedible	—	1,371,866	1,336,103
Olive foots	—	7,536,796	6,046,782
Palm-kernel, crude	—	9,426,579	16,583,451
Palm-kernel, refined	4,781,489	4,728,914	621,663
Rapeseed	—	3,655,930	3,849,388
Linseed	206,273,130	117,794,104	157,754,348
Chinese wood oil	—	22,834,726	25,424,215
Chinese vegetable tallow	—	783,198	1,103,270
Castor	18,834,778	7,706,043	7,539,171
Palm	—	45,039,977	21,739,772
All other	1,065,708	2,492,321	2,239,533
FISH OILS:[1]			
Cod and cod-liver	865,595	4,178,469	8,027,172
Menhaden	7,223,340	16,056,042	16,436,265
Whale	953,625	19,656,932	38,108,081
Herring, including sardine	11,652,360	13,751,929	25,576,478
Sperm	1,500	182,003	2,183,493
All other, (including marine animal)	459,398	732,630	666,755
ANIMAL FATS:			
Lard, neutral	10,843,228	6,925,147	4,779,335
Lard, other edible	458,910,206	3,360,237	73,622,927
Tallow, edible	10,709,746	7,273,219	3,592,494
Tallow, inedible	98,342,466	123,808,881	66,626,820
Neat's-foot oil	1,578,968	1,697,663	1,326,207

(1) The data of oils produced, consumed, and on hand by fish oil producers and fish canners were collected by the Bureau of Fisheries.

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS

	Factory operations for the quarter ended Dec. 31, 1928		Factory and Ware'se stocks
	Production (pounds)	Consumption (pounds)	Dec. 31, 1928 (pounds)
GREASES:			
White	19,143,155	7,410,204	9,236,938
Yellow	19,531,709	15,180,013	8,219,178
Brown	12,352,140	15,341,075	5,850,219
Bone	5,152,809	85,432	1,560,851
Tankage	13,089,071	805,025	2,681,028
Garbage or house	21,136,857	21,370,662	6,310,435
Wool	1,812,631	1,616,806	3,241,887
Recovered	612,398	717,579	578,553
All other	2,119,440	1,248,007	1,758,119
OTHER PRODUCTS:			
Lard compounds and other lard substitutes	296,875,248	70,702	29,915,766
Hydrogenated oils	178,992,523	170,345,277	15,974,715
Stearin, vegetable	4,290,830	5,590,930	3,069,788
Stearin, animal, edible	14,841,768	12,814,319	5,112,046
Stearin, animal, inedible	4,166,881	7,059,185	4,202,348
Oleo oil	27,635,041	13,418,326	13,014,752
Lard oil	5,432,869	4,373,231	3,509,226
Tallow oil	3,354,197	2,210,503	1,963,397
Fatty acids	36,964,698	40,164,327	6,605,255
Fatty acids, distilled	13,759,836	11,455,276	2,603,317
Red oil	17,711,677	7,970,245	8,805,809
Stearic acid	10,825,925	2,184,652	3,317,085
Glycerin, crude 80% basis	32,702,536	37,626,517	17,910,908
Glycerin, dynamite	12,143,009	8,653,074	9,909,855
Glycerin, chemically pure	19,119,477	1,827,759	8,053,967
Cottonseed foots, 50% basis	91,021,438	85,183,180	28,155,268
Cottonseed foots, distilled	28,567,048	26,274,710	5,957,014
Other vegetable oil foots	24,050,756	23,559,583	5,291,218
Other vegetable oil foots, distilled	180,505	1,005,460	253,497
Acidulated soap stock	29,535,452	13,518,088	16,157,477
Miscellaneous soap stock	38,602	53,273	199,838

RAW MATERIALS USED IN THE MANUFACTURE OF VEGETABLE OILS

KIND	Tons of 2000 pounds Consumed Oct.1 to Dec. 31	On hand Dec. 31	KIND	Tons of 2000 pounds Consumed Oct.1 to Dec. 31	On hand Dec. 31
Cottonseed	2,473,746	1,328,703	Flaxseed	313,346	214,578
Peanuts, hulled	3,716	301	Castor beans	21,014	6,102
Peanuts, in the hull	1,796	268	Mustard seed	403	1,319
Copra	69,124	22,793	Soya-beans	5,740	1,392
Coconuts and skins	1,231	20	Olives	1,696	3
Corn germs	52,439	412	Other kinds	2,634	683

IMPORTS OF OIL SEEDS, QUARTER ENDED DEC. 31, 1928

KIND	Tons	KIND	Tons
Cotton seed	497	Poppy seed	1,390
Castor beans	19,740	Perilla and sesame seed	720
Copra	82,395	Other oil seeds	3,063
Flaxseed	116,434		

IMPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED DEC. 31, 1928

KIND	Pounds	KIND	Pounds
Tallow	3,771,797	Palm oil	44,222,708
Other animal oils & fats, edible	438,020	Palm-kernel oil	20,375,996
Whale oil	1,945,178	Sesame oil	1,736,631
Cod oil	4,529,055	Vegetable wax	1,037,229
Cod-liver oil	6,775,013	Carnauba wax	1,180,971
Other fish oils	11,604,480	Peanut oil	614,404
Wool grease	3,162,925	Rape oil	4,630,793
Olive oil, edible	17,888,254	Linseed oil	11,148
Chinese wood oil	25,504,635	Soya-bean oil	2,253,502
Coconut oil	97,649,657	Perilla oil	452,763
Olive foots	8,552,430	Other expressed oils	1,853,413
Other olive oil, inedible	2,234,371	Glycerin, crude	2,767,766
		Glycerin, refined	3,124,090

(*Turn to Page* 43)

ABSTRACTS

David Wesson, *Abstract Editor*

From recently conducted critical studies of the Halphen test, J. Pieraerts and Emile Simar report as follows: (a) No increase in sensitivity is obtained by diluting the product under test; (b) pure furfural has no effect on the reaction; (c) pyridine increases the speed and sensitivity of the reaction; (d) contrary to Gastaldi, very pure amyl alcohol does not give the same coloration with the Halphen reaction. *Mat. grasses* 20, 8312-6 (1928)

A new apparatus for the reduction of nickel catalyst is described in *Masloboino Zhirovoe Delo No.* 2, 8-11, (1928). The author claims the advantages for his apparatus of mechanical charge and discharge, absolute tightness during the complete operation, very good contact between the hydrogen and the catalyst, the possibility of drawing samples during the process without cooling the apparatus, and the possibility of discharging the catalyst while hot.

Methods heretofore used for the isolation of erucic acid from rapeseed oil have been unsatisfactory, due to difficulty of manipulation, or to low yield or impurity of product. A newly reported method is based on the observation that by adding small quantities of lead acetate to the alcoholic solution of the total fatty acids obtained from the oil, the saturated acids are precipitated first. The other unsaturated acids are separated by means of magnesium acetate. It is claimed that this method gives a good yield of pure erucic acid. *Z. angew. Chem.* 41, 157-9, (1928).

A heavy lubricant, substitute for castor oil, designated as "Mineral Castor Oil" is prepared by mixing a basic aluminum soap with mineral oil. The aluminum soap is prepared by precipitation from an aqueous soap solution with a solution of an aluminum salt, in the presence of an alkali. U. S. Patent No. 1,691,654.

The German Commission for Fat Analysis is standardizing the methods for the analysis of Turkey Red oil, and is broadcasting some questions for public discussion on the methods for such sulfonated oils that can be split quantitatively with concentrated hydrochloric acid. *Chem. Umschau Fette, Oele, Wachse u. Harze* 35, 270-4 (1928).

The percentage of saturated constituents in those fats which contain only triolein and trilinolin as their unsaturated components may be calculated from the thiocyanate numbers of triolein and trilinolin, which are 86.06 and 86.65 respectively. The equation for determining the saturated constituents is given in *Z. angew. Chem.* 41, 1046-8 (1928).

Lignoceric acid has been detected as present in olive oil extracted by carbon disulfide, and may account for the variations in the constants of such oil from those of other olive oils. *Chem. Umschau Fette, Oele, Wachse u. Harze* 35, 275-7 (1928).

It is stated that the formation of isooleic acid in the hydrogenation of soya bean oil is lessened when the reaction temperature is maintained at low levels. The greater the amount of catalyzer used the greater will be the formation of isooleic acid. Small percentages of copper in the nickel catalyzer cause the formation of a large amount of the isooleic acid, but increase of the percentage of copper to four percent seems to reduce this formation of isooleic acid. *J. Soc. Chem. Ind. (Japan)* 31, 467-9; *Suppl. Binding* 111-2B (1928).

The color of fatty acids obtained by saponifying natural fats with "Kontakt" reagent may be improved by washing the fats before saponification with a mixture of sulfuric acid and soluble sulfates. For vegetable oils sodium sulfate is used and for animal oils a mixture of sodium sulfate and zinc sulfate has been found preferable. *Masloboino Zhirovoe Delo* 1928 No. 1, 28-30.

Chloroform, alcohol, ether, and chloral hydrate are said to possess the common property of accelerating the reaction between caustic soda or soda ash and free fatty acids in the saponification of olive oil and oleic acid. *Boll. soc. ital. biol. sper.* 3, 359-62 (1928).

Concerning Neatsfoot Oil and Its Adulteration*

By Dr. Martin Auerbach

Under the above title I published in No. 31 of *Seifensieder-Zeitung* some experiences which I had in my laboratory concerning the adulteration and examination of neatsfoot oils. Some weeks ago there came under my observation an oil on which a test for adulteration was made which certainly is to be designated as original.

The sample was labeled: "Neatsfoot Oil," (purely animal oil).

The appearance of the sample was rather striking. It showed an unusual fluorescence. By analysis it was established to contain:

Water (volatile at 100°)	traces
Mineral substance	traces
Organic substances (insoluble in ether)	.0%
Unsaponifiable matter	52.5%
Saponifiable matter (by difference)	47.5%
Free fatty acid, as oleic acid	1.6%

The unsaponifiable parts were on account of their fluorescence pronounced to be mineral oil without further investigation. To this decision objection was made and there was submitted to me an analysis which contained the following data:

Specific gravity at 15°	.890
Freezing point	—6°
Point of turbidity	—1°
Iodine number	40—42
Free fatty acids	2—3%
Unsaponifiable matter	43%

Although every specialist recognizes from these data with certainty that pure neatsfoot oil is not involved in this case, the attempt at deception was contained by the claim in writing that the oil in question was absolutely pure animal oil, and that most chemists pronounce the unsaponifiable ingredients falsely to be mineral oils. It was stated that in America the chemists involved had become convinced of the fact that the oil involved was in reality 100% pure animal oil.

The further proceedings as well as the further investigations excluding the oil resulted in a perfectly clear picture concerning the attempt at deception. The unsaponifiable matter was in reality not mineral oil, but proved to be wool fat olein by reason of its iodine number and its optical property.

Although I hardly believe that American chemists are willing to designate an oil of this kind, originating it is true from an animal product, as a purely animal oil, I myself had difficulties, in view of these American assertions, to make clear to my agent that the oil was neither a pure neatsfoot oil—which he was willing to acknowledge in any event—nor in general a pure animal oil.

I believe that this attempt at misleading the consumers of the expensive neatsfoot oil deserves general interest.

* *Seifens.-Ztg.*, Vol. 55, No. 34.

Gold Dust Plan Effective

The Gold Dust Corporation has announced that more than 51 per cent. of the capital stock of the Standard Milling Company have been deposited with the Equitable Trust Company as assenting to the offer of last Jan. 8, under which Gold Dust offered its securities in exchange for those of Standard Milling.

New Books

Glycerol and the Glycols by James W. Lawrie, Ph.D. Published by Chemical Catalog Co., Inc., New York, 425 pages. Binding cloth. Size, 6¼ by 9¼. The first five chapters of the book are devoted to a review of the various methods of production of glycerol. Its physical and chemical properties are then analyzed, and quantitative and qualitative tests are given. International standard specifications are listed, and statistics concerning past production and price trends are presented. Two chapters are devoted to the production and properties of nitroglycerol and the glycols. The commercial uses of these products are enumerated, and the book closes with an attempt to forecast the future use and importance of glycerol.

The Virginia State Conservation and Development Commission of Richmond has recently issued a most attractive brochure entitled "Industrial Virginia," which the Commission describes as "A brief industrial sketch and fact sheet. This booklet gives the pertinent facts concerning the developed industries and the industrial opportunities in the "Old Dominion." It contains a wealth of interesting material attractively and concisely presented, and should have a place in the file of every industrialist. Copies of the booklet may be obtained from E. O. Fippin, Secretary, State Conservation and Development Commission, Richmond, Virginia.

Market Report on

FATS, OILS AND GREASES

(*As of Feb. 5, 1929*)

NEW YORK—The price trend in the market for oils, fats and greases has been generally upward through the period just completed. Reacting from the holiday slump, a number of the oils gained ground, and closed at higher levels. Corn oil continued its upward movement as the result of short stocks, and cottonseed oil did likewise. Lighter hog receipts at the close raised the price of lard, and gave a strong undertone to the whole market. Olive oil, olive oil foots, linseed oil and red oil all registered price gains. Refined Menhaden was sharply higher, the crude being quoted at only nominal prices. Coconut oil and copra were lower, as the result of lower cables from Manila. Lard oil was quoted at fractionally lower figures.

COCONUT OIL

Prices were shaded again during the period, and spot Manila sold as low as 8¼c lb. Coast tanks sold down to 7⅞c lb. Copra was priced lower at 4¾c to 4⅞c lb. The market tended stronger at the close on shorter offerings.

CORN OIL

Stocks of this oil continued light, with resultant price advances. Tanks closed higher at 9c to 9¼c lb., with bbls. still 10c to 10½c, and refined oil 12c to 12½c. The fatty acid was priced at 12c.

COTTONSEED OIL

Shorter offerings and increasing demand raised the price of cottonseed oil during the period. A shortage of hog lard, with consequent higher prices, contributed to the rise in cottonseed oil prices. Crude closed at 9c with P. S. Y. at 10½c to 11c lb. Fatty acid closed at 10½c.

GREASE AND LARD

Greases were stable at the closing prices of last period. In some cases these were shaded slightly. Lard rose ½c to ¾c lb. on most grades in the latter part of the month. City extra closed at 11½c to 11¾c lb., with midwestern tierces at 12c to 12¼c lb., and prime western at 12¼c.

OLIVE OIL AND OLIVE OIL FOOTS

With depleted stocks and a steady inquiry, olive oil and olive oil foots gained strength during the period, and closed at generally higher levels. New York bbls. were quoted from $1.35 to $1.50 gal., with shipments slightly less. Foots could be bought from 11½c to 11¾c lb., with shipments at lower rates.

LINSEED OIL

Linseed recovered after the holiday slump, and was 10c a hundred higher at the close, on every grade except Calcutta. The base price for crude oil in car lots was 10-1/10c lb. Boiled oil in tanks was priced at 9-7/10c, with refined, in bbls., at 10-9/10c lb. Cake was slightly lower than last period's closing, with meal slightly higher.

RED OIL AND STEARIC ACID

Red oil firmed during the period as a result of more active inquiry, and rose to 10½c to 11c lb. for distilled oil in bbls., and 9¾c in tanks. Saponified was quoted at 10½c to 11c lb. in bbls. Stearic acid was unchanged at 18c to 18½c lb. for double pressed, and 20c to 20½c for triple pressed.

Stearic acid was priced at 14¼c for triple pressed at the beginning of 1928. These prices held firm until September when increased demand and reduced stocks combined to boost the price. It reached 16¼c in September, 17¼c in October and 20¼c in November and December where it closed the year.

MENHADEN OIL

A seasonal rise in the price of this oil occurred during the period. With depleted stocks of crude oil, the price of 48c gal. was only nominal, it being almost impossible to obtain this oil. Refined oil rose sharply during the period, and closed at 69c gal., inside, for light pressed, 71c for yellow bleached, and 74c for white bleached.

TALLOW

Short stocks and continued demand combined to raise the price of tallow toward the close of the period. The various classes closed fractionally higher, with city extra at 9⅛c to 9¼c lb., and special at 9c to 9⅛c lb. Animal edible tallow in bbls. was priced at 9⅞c to 10c lb.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.14¾	.15
Coast, tanks, spot	lb.	.13¼	.13½
Futures	lb.	.13¼	—
Coconut, Ceylon grade, bbls.	lb.	.09½	—
Coast, tanks	lb.	.08	—
Cochin grade, bbls.	lb.	.09¾	—
Manila, bbls.	lb.	.09¾	—
Tanks	lb.	.08⅜	—
Coast tanks	lb.	.07⅞	—
Fatty acids, mill, tanks	lb.	.11¼	—
Cod, Newfoundland, bbls.	gal.	.65	.66
Copra, bags, Coast	lb.	.04¾	.04⅞
Corn, tank, mills	lb.	.09	.09¼
Bbls., New York	lb.	.10	.10½
Refined, bbls.	lb.	.12	
Fatty acid	lb.	.10	
Cottonseed, crude, tanks, mill	lb.	.09	—
P. S. Y.	lb.	.10½	.11
Fatty acids, mill, bbls.	lb.	.10½	
Degras, domestic, bbls.	lb.	.04½	.06
English, bbls.	lb.	.05	.05½
German, bbls.	lb.	.03¾	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08¼	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbls. N. Y.	lb.	.08¾	.10
Yellow	lb.	.08¼	.08½
Brown	lb.	.08¼	.08½
House	lb.	.08¼	.08½
Bone Naphtha	lb.	—	.08⅛
Herring, coast tanks	gal.	.40	—
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.11½	.11¾
Compound, tierces	lb.	.12	.12¼
Middle Western, tierces	lb.	.12	.12¼
Neutral, tierces	lb.	.13	—
Prime Western, tierces	lb.	.12¼	—
Lard oil, No. 1, bbls.	lb.	.12¼	—
No. 2, bbls.	lb.	.12	—
Extra, bbls.	lb.	.13	—
No. 1, bbls.	lb.	.12¾	—
Winter strained, bbls.	lb.	.13½	—
Prime, bbls.	lb.	.15½	—
Linseed Oil, boiled, tanks	lb.	.0970	—
Car lots, bbls.	lb.	.1050	—
Less car lots, bbls.	lb.	.1090	—
Less than 5 bbls.	lb.	.1130	—
Double boiled, less than five bbls.	lb.	.1160	.1170
Raw, tanks	lb.	.0930	—
Car lots, bbls.	lb.	.1010	—
Less car lots, bbls.	lb.	.1050	—
Less than 5 bbls.	lb.	.1090	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1090	.1130
Varnish grades, bbls.	lb.	.1110	.1150
Linseed cake, bags	ton	47.00	48.00
Meal, bags	ton	57.00	—
Menhaden, crude, tanks, Baltimore	gal.	.48	—
Light pressed, bbls.	gal.	.69	.71
Yellow bleached, bbls.	gal.	.71	.73
White bleached, bbls.	gal.	.74	.76
Mustard, bbls.	gal.	.90	—
Neatsfoot, cold pressed, bbls.	lb.	.19	—
Extra, bbls.	lb.	.13	—
No. 1, bbls.	lb.	.12¾	—
Pure, bbls.	lb.	.15¼	—
Oleo, No. 1, bbls.	lb.	.11½	—
No. 2, bbls.	lb.	.11	—
No. 3, bbls.	lb.	.10½	—
Olive, denatured, bbls., N. Y.	gal.	1.35	1.50
Shipments	gal.	1.32	1.40
Foots, bbls.	lb.	.11½	.11¾
Shipments	lb.	.10¼	.10½
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, casks spot	lb.	.09	.09¼
Shipments	lb.	.08¾	—
Niger, casks, spot	lb.	.08½	—
Shipments	lb.	.08	—
Palm Kernel, pkgs.	lb.	.09⅛	.09¼
Tank cars	lb.	.08⅜	.08½
Peanut, crude bbls.	lb.	.12	—
Mills, tanks	lb.	.10	—
Refined, bbls.	lb.	.13½	—
Perilla, bbls.	lb.	.16	—
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.03	1.04
Refined, bbls.	lb.	.83	.84
Red Oil, distilled, bbls.	lb.	.10½	.11
Tanks	lb.	.09¾	—
Saponified, bbls.	lb.	.10½	.11
Tanks	lb.	.09¾	—
Salmon, coast, tanks	gal.	.44	—
Sardine, coast, tanks	gal.	.45	—
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.12¼	.12½
Orient, coast tanks	lb.	.09¾	—
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.86
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.18	.18½
Triple pressed, bags	lb.	.20	.20½
Stearine oleo, bbls.	lb.	.11½	.12
Tallow, edible, bbls.	lb.	.09¾	.10
City extra, works, loose	lb.	.09	.09¼
Special, works, loose	lb.	.09	.09¼
Tallow oil, acidless, bbls.	lb.	.11¾	—
Tanks, N. Y.	lb.	.11½	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07¼	—
No. 2, coast, tanks	lb.	.06¾	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Chocolate Products Tested by Federal Agents

"Chocolate products shipped in interstate commerce and the raw materials imported for use in their manufacture are systematically examined to see that they comply with the provisions of the Federal food and drugs act," says Dr. P. B. Dunbar, assistant chief of the Food, Drug and Insecticide administration of the Department of Agriculture, when his attention was called to a statement that chocolate products adulterated with clay and synthetic flavors were being sold to children and that it was, apparently, no one's business to check the practice.

"We have not found chocolate products adulterated with clay, although we have made recently an extensive survey of the industry," continued Dr. Dunbar. "If such articles coming within the jurisdiction of the Federal food and drugs act were found, prompt action would be taken to remove them from the market. The Federal law does not prohibit the use of harmless synthetic flavors in candy. However, where such flavors are substituted for genuine flavors, the act requires that the finished article be branded in such a way as to call attention conspicuously to the substitution."

Dr. Dunbar pointed out that chocolate products were given much attention in the enforcement of the Federal Food and Drugs Act.

"Systematic inspections are made," he said, "by our field agents, of factories whose output is distributed in interstate commerce and every complaint against them is investigated. In addition to these inspections, many samples are collected and analyzed. Since the first of the fiscal year beginning July 1, 1927, 255 such samples have been examined in our laboratories and, where illegal products were encountered, appropriate steps were taken to correct the practice. When cases instituted in the Federal courts under the Food and Drugs Act are terminated, notices of judgment are published. Several such notices of judgment dealing with chocolate products have been issued.

"In addition to the surveillance maintained over domestic chocolate products, we examine the raw materials used in their manufacture when imported. Beans are either destroyed, exported, separated into good and bad portions and the bad destroyed or reconditioned so as to comply with the requirements of the act."

G. A. Wharry & Co., vegetable oils, New York, have moved from 25 Beaver st. to larger quarters at 15 Moore st.

Farmers Ask Higher Flax Duties

Representative Burtness of North Dakota and representatives of various farm organizations and state agricultural colleges in Minnesota, North and South Dakota and Montana appeared before the Tariff Commission recently at the hearings in support of an increase of 50 per cent in the present duty on imported flaxseed, coming chiefly from Argentina.

It was pointed out to the Commission that the 50 per cent. increase is necessary in order to bring about a partial equalization of production costs between flaxseed grown in this country and Argentina. Two of the principal witnesses called to the stand by Representative Burtness, who handled the case, were John L. Coulter, president, and Dr. H. A. Benron, farm economist, of the North Dakota State Agricultural College. They endorsed the statement prepared by the Commission's experts covering the cost of production of flaxseed, both domestic and foreign.

Mr. Burtness told the Commission that in 1925-1926, the period selected by the Commission, it cost flax growers $2.45 to produce a bushel of flaxseed against a price of $2.13 received by the farmers.

Nigeria Aids Palm Oil Producers

Improved methods of extracting palm oil and palm kernels from the fruit of the palm tree are being advocated by the Nigerian government. Nigeria has long been the most important producer of these oils in the world, but is now facing stronger competition from Sumatra and Belgian Congo. To fight this the officials believe it necessary to cut production costs and eliminate waste by licensing extraction plants to replace the crude and wasteful native methods of oil extraction which is said to waste fifty percent of the oil. This step has been long delayed because of fear that foreign capital might dominate the extraction field, and gradually gain control of the whole productive system. It is now proposed to license a limited number of factories, separated by twenty miles from each other, to do the work with government financial assistance.

American Solvents & Chemical Corp. has secured the exclusive sales rights in United States and Canada for Vitrite, a decolorizing agent produced in India by a British syndicate.

Dr. Irving Langmuir, assistant director, General Electric Research Laboratory, Schenectady, was elected president of American Chemical Society for 1929, at a recent meeting.

What Tariff?

(*From Page* 13)

From Animal Fat Renderers

"We feel that prices would be firmer and more steady, and not subject to the present fluctuations as experienced from time to time when foreign materials are imported."

"Would bring the value of our tallow in line with what raw materials are worth."

From Candle Manufacturers

"This country is short over seven hundred million pounds of inedible fats and oils—a tariff on them would increase cost, which would stimulate substitutes."

"Keep raw materials free and protect finished products."

"Would reduce consumption, because of higher cost of finished product."

From Import and Export Dealers

"Higher domestic market probably means reduced foreign outlets."

"This country has developed to a point where we must look to foreign trade and permitting importation of reasonable amount of vegetable oils will release our higher priced cottonseed oil for export."

A prominent firm of importers and commission merchants have contributed the following analysis of the situation, which is so clearly expressed that we are publishing it in full without comment, as follows:

"We are opposed to any tariff on oils and fats for the following reasons:

"1. There are no domestic producers who can derive any benefits from duties on foreign oils and fats except butter producers and flaxseed growers. In the case of all other producers the oil and fat content of the major crops which he grows is so small that protection cannot 'register.'

"2. Industries which depend upon foreign oils and fats are seriously injured by useless barriers against their raw materials.

"3. Trade is curtailed as evidenced by our loss of export business in oils and fats and kindred products.

"No student of the economics of oils and fats in the United States can be in favor of Tariff on any products except butter, flaxseed and linseed oil."

The Consumers' View

(*From Page* 26)

foods, has been used by the Federal government for more than 30 years, and without any difficulties.

All oils not so denaturized, irrespective of their country of origin, and intended to enter into competition with edible oils produced in the United States, would be required to pay an adequate import duty.

This is certainly the simple and direct method of giving dairy interests the protection they desire—and which they certainly cannot get by any other practicable method yet proposed—while at the same time avoiding the useless burden of increased costs of soaps, varnish, paint, enamels, leather, textiles, tin plate, artificial leather, lubricants and the hundred other articles which a general tariff on edible vegetable oils would involve.

Fat & Oil Data

(*From Page* 36)

EXPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED DEC. 31, 1928

Kind	Pounds	Kind	Pounds
Fish oils	975,624	Palm & palm-kernel oil	181,475
Other animal oils & fats, inedible	12,762	Peanut oil	13,714
Olive oil, edible	15,459	Soya-bean oil	124,947
Chinese wood oil or nut oil	1,307,178	Other expressed oils	53,232
Coconut oil	365,170	Vegetable wax	118,395

EXPORTS OF DOMESTIC FATS AND OILS, QUARTER ENDED DEC. 31, 1928

Kind	Pounds	Kind	Pounds
Oleo oil	13,727,260	Other animal greases & fats	13,993,907
Oleo stock	1,143,488	Cottonseed oil, crude	10,314,813
Tallow	458,358	Cottonseed oil, refined	2,344,882
Lard	213,938,384	Corn oil	47,423
Lard, neutral	3,810,748	Vegetable oil lard compounds	1,605,919
Lard compounds, containing animal fats	1,350,742	Other edible vegetable oils & fats	897,211
Oleo and lard stearin	922,643	Coconut oil	5,307,776
Neat's-foot oil	386,760	Linseed oil	471,407
Other animal oils, inedible	255,592	Soya-bean oil	1,651,085
Fish oils	209,560	Vegetable soap stock	1,965,181
Grease stearin	399,221	Other expressed oils & fats, inedible	1,998,320
Oleic acid, or red oil	1,988,897	Glycerin	285,116
Stearic acid	474,492		

OIL & FAT INDUSTRIES

The Editor's Page

Declining Exports

ELSEWHERE in this issue we present a summary of the figures of the Foodstuffs Division of the Department of Commerce covering United States exports of oils and fats (vegetable and animal) and allied products for the calendar year 1928, with comparative figures for 1927. Examination, however casual, of these figures, must bring us to only one conclusion, which is that, whatever may be the cause, the export trade of this country in oils and fats is declining rapidly.

Whether this may be due solely to increased demand at home, with consequent reduction in the available surplus for export, we will not undertake to decide. It does seem advisable that those who are advocating greatly advanced import tariffs should ponder the possibility that these advanced rates may accelerate the slump in their own export trade in these commodities. The Germans, for example, are a most adaptable race, ready to seize any opportunity for substitution of cheaper raw materials which may present itself. Close American markets to soya bean oil, palm kernel oil, and whale oil, and they *may* possibly supplant American lard in the German market at a lower price.

Chemical development toward the interchange of inedible and edible oils *may* have progressed farther in Europe than in this country, and there is scarcely any doubt that the European taste is a little less fastidious than American, thus permitting more latitude to the European oil refiner in the matter of substitution of such oils as hydrogenated fish oil, whale oil, or soya bean oil in lard compounds or margarines. These conditions can hardly fail to cause appreciable decreases in American exports of lard and competing oils and fats. African and Chinese peanut oils, likewise, may supplant what American cottonseed and corn oils now find their way into the salad and cooking oil markets of Southern Europe.

In the Cuban and South American markets the American oil refiner may meet twofold competition. The cheaper raw materials available to European refiners because of the United States tariff may be reflected in more aggressive competition from these European refiners in our Latin American markets, and the local refining industries of the Latin American countries may be stimulated, likewise, by the lack of American competition in the purchase of their raw materials.

The question really resolves itself into two queries, first: Will America consume all the edible oils and fats produced or capable of production within her borders; second: Can America produce her full requirements in edible oils and fats. It may be that the most desirable situation for our oil producers and refiners will be that of self-contained industry, supplying only the needs of the home markets for edible oils and fats and providing fully for the required technical and soap oils with the surplus which would otherwise be exported. Under such conditions, the producers and refiners of our high-class cottonseed, peanut and corn oils would have to be satisfied with soapmakers' prices, or the soapmakers would have to pay edible prices for their stocks. In the latter case, the cost of soap to the consumer would increase rapidly, but it is also within the realm of possibilities that the synthetic methods of the organic chemist will produce from coal or other cheap product, such fats or fat-like substances as will meet entirely the needs of the soapmaker.

Careless Storing of Oils

Refiners of edible and fine technical oils often expend thousands of dollars for refining equipment and processes, having in mind the production of the very highest quality products in their line, and then revert to the methods of forty years ago for the storage of these valuable products, often losing thereby all that has been gained by the use of modern refining methods.

It is recognized by all who have studied the matter closely that fatty oils deteriorate rapidly in contact with light and air, that small per-

centages of free fatty acids will quickly attack the metal of any container constructed of other than non-corrosive material. Edible oils stored in silicated barrels are likewise liable to deterioration, particularly if the silicate lining is not given time to dry thoroughly before the barrels are filled, or if the oil is filled into the barrels at too high a temperature, thus softening the lining.

It may be regarded as a determined fact that the most successful manufacturer and refiner of fine oils will be the one who devotes considerable study to the proper method of storing his products after manufacture, as well as to the problems of quality production in the refining operations.

The Tariff Questionnaire

THE intense interest throughout the oil, fat and associated industries and the consuming groups in the proposed 45 per cent tariff on all imported fats and oils, has been reflected in additional replies to the questionnaire of *Oil & Fat Industries* which have been returned to us since the February issue was published. A number of returned questionnaires, too late to be included in the results which were analyzed in the February number, reveal results in much the same proportion of divided opinion as those which were included in the original discussion.

Of the questionnaires received late, 47 per cent were in favor of the tariff and 53 per cent were against. Those in favor included chiefly cotton and peanut oil crushers; those opposed were cocoanut oil crushers and refiners, margarin and lard compound manufacturers, several manufacturers and refiners of fish oils, animal oils, and a producer of stearic acid and red oil. The split up is much the same as in the original group of questionnaires received by us.

The manner in which opinion is divided and the way in which diversified interests are involved in this tariff question only emphasizes the fact, pointed out a month ago, that careful study and consideration is more needed than hasty legislation. While one crusher of cotton oil states that the higher tariff would bring better prices and encourage the production of more and better seed and oil, a refiner of the same oil sees in the tariff a cause for materially curtailed consumption because of the higher prices. Thus it goes.

The diversity of the opinions on the fat and oil tariff question and the evenness with which opinions for and against are split, leads us to believe that the readjustment of any tariff is the job of a special committee or commission and not the work of a legislative body or a general legislative committee such as the Ways and Means Committee. From the innumerable angles from which the tariff is viewed by various factors in the industry, as revealed by the replies to our questionnaire, we believe that any broad sweeping legislation carrying a single rate of duty on all oils and fats would be eminently unfair, and in the long run, would not be of any permanent value to American oil crushers. We again urge all factors involved in this tariff controversy to act slowly and deliberately after due study and consideration, and not to be actuated wholly by what seem to be immediate interests.

THE Twentieth Annual Convention of The American Oil Chemists' Society will be held at The Roosevelt Hotel, New Orleans, La., on the 13th and 14th of May, 1929. All members are urged to make their hotel reservations early, as an exceptionally large attendance is expected at the meeting this year. Full details, including the program of the Convention, will be published in the next issue of *Oil & Fat Industries*.

The Mayonnaise Products Manufacturers Association held a series of informal meetings in Chicago during the Canners' Convention in the last week of January. Monday and Tuesday were devoted to Committee meetings. The Committees which met were the Standards and Research Committee, the Trade Practice Committee, the Glass Container Committee and the Transportation Committee. Wednesday morning was occupied by a Board Meeting, presided over by Richard Hellman, and in the afternoon a general meeting was held for active and associate members, which was well attended. Vice-President E. P. Kelly presided over the latter meeting, in the absence of President McCormick, who was prevented from attending by illness in his family.

Research and the Mayonnaise Industry*

By Dr. F. C. Blanck

(In Charge, Food Research Division, Bureau of Chemistry and Soils, U. S. Department of Agriculture)

THE remarkable growth in the commercial production of mayonnaise is one of the romances of our present food industry. This rapid development has already prompted you to organize as a trade association for the consideration of the many problems which effect you both as individual producers and as an industry. In this way you are avoiding duplication of effort, economizing in funds, securing maximum results in a minimum of time, and are well informed about the status of all new developments. In organizing your associational activities, you have provided very wisely for a Standards and Research Committee. This action clearly evidences the fact that you, as business men, recognize the fact that your industry is one in which both art and science are involved. The real foundation of the successful production of mayonnaise goes back to the field of pure science. I see a further appreciation on your part that the solution of technical problems with which you are and will be concerned must be in the hands of men well trained and equipped to solve these questions.

In this short talk I hope to bring out certain ideas on research in relation to your industry; in other words, to sell you, as business men, the idea that research, properly conducted, is an indispensable part of our modern industrial scheme, and to offer certain suggestions regarding the organization of a research program in the mayonnaise field with the necessary coordination of the various activities in this special field of research. I realize, as Dr. Miner has recently said, that the present attitude of business toward research is decidedly friendly. In fact, research is as popular with industry as vitamins are with the general public, and just about as well understood. Both are being given an enthusiastic trial. If the public finds that by increasing the proportion of the mysterious A, B, C, D, E's in the diet the public health is actually improved they will probably come to believe in vitamins. * * * They are, however, rather anxious to be convinced. The industrialists feel much the same way about research. The war greatly advertised its value, and at once research became fashionable in business circles. Many feel that the research is the sure salvation of our economic souls. Many organizations have sampled this new style business accessory and a few have made it a permanent part of their equipment. * * * With industry in general, however, research is on trial, and the results of the near future will determine in a large measure the speed with which industry generally will adopt research. The success of such research will be measured by the magnitude of the accruing profits."

Industrial research took to discover something that the public or industry wants, and the benefits derived therefrom are measured by the profits obtained. Some two years ago Dr. Little made the significant statement that "industrial progress can, however, only be assured by the constant acquirement of new knowledge, which points the way to better control of operations, to new and better processes, new raw materials, new products and to those new uses which extend the market." As Willis R. Whitney said, "We must first find facts, then find out how to use them." Quoting further, Dr. Little said that "In a very real sense research is the mother of industry and may even dispute with necessity the parentage of invention." He pointed out that "Industrial research differs from pure research only in its motive and its immediate objective. It employs the same methods, demands the same skill and the same high intelligence in training. It is, however, and not wholly to its disadvantage, always under a pressure of the time factor, from which the worker in pure science is measurably free, and it must, if it is to be regarded as successful, pay its own way and yield a profit."

Basically, research is divided into two classes: the first, pure scientific or fundamental research; the second industrial research. The distinction between these two

*Address before the 3rd Annual Convention of Mayonnaise Products Manufacturers Assoc.

types is primarily in the purpose for which the research is undertaken. The relation of research to a business organization is splendidly developed in an address given by Dr. Holland of the National Research Council before the Glass Container Association in May, 1926. In this address he pointed out that "Pure science research is fundamental; applied research is consequential. The one reveals the sources of nature; the other controls them. The one is the foundation; the other is the superstructure." Continuing, he said, "I like to think of modern industry in terms of research as a towering skyscraper, the foundation securely anchored in the bedrock of pure science, the frame of steel girders, strong, flexible sinews of applied science or industrial research, and the stone and mortar the practical knowledge or experience of the technology of industry. In less learned terms then, research, when stripped of technical phraseology, is in fact accelerated experience." Continuing, he said, "To the average American business man research is a mysterious business, into which he must pour an endless stream of appropriations, and from which in this day of mass production he expects to turn a crank and grind out a constant stream of dollars in dividends."

There is no question about the applicability of research to all industries. However, its progress in an individual industry depends on a number of factors which are inherent in the industry itself. It is quite obvious that an industry which has been founded largely on tradition and where the technology has been handed down from generation to generation is slower to undertake a scientific study of these processes than is a new industry, especially if the new industry is recognized as an outgrowth of distinctly scientific work. It is only necessary to compare for a moment the status of several of the older industries in our American business field with certain of our younger industries which have primarily received their impetus as a result of a scientific discovery or invention. The automobile industry had its beginning only a little over thirty years ago with the granting of the first patent in this field to Selden. The marvelous growth of this industry fostered and boosted by new scientific discoveries and invenions, has resulted in bringing this industry to the firs place in point of value of all our American industries. Other industries which have achieved similar and lasting success such as the radio illumination, and the telephone, all owe their origin and subsequent rise to scientific research.

Babson, in one of his barometer letters a few years ago, said, "The time has passed when advertising alone will get sales. The two best salesmen today are a 'better product' and a 'cheaper way of making it.' Research opens the way to both. Furthermore, since the most competition is not between concerns but between industries, we urge clients to combine their energies with others in the same line of business." Babson states further, "If I read the trend of modern business correctly, I would say co-operation, not competition, is the life of business." A striking illustration of the value of co-operative effort in research is furnished by the scheme for industrial research which is now in active operation in England. There they have a governmental department of scientific and industrial research, and a very considerable number of co-operative trade research associations are in existence which operate under a subsidy from the Government, the basis of this subsidy being equal contributions from the Government and the industry involved for the conduct of the particular research program for a specified period of time. These research associations have not only been successful in solving some of the needed problems confronting these industries, but they have promoted more harmonious relationship between the individual members of these associations. They have clarified or explained so-called trade secrets and furnished a common meeting ground on which individual manufacturers can freely discuss current problems and thus secure the benefit of a widened experience. In our own country we have striking illustrations of the importance and value of both the trade association research organizations' and the individual corporate organizations' programs. In the latter it is only necessary to mention such outstanding organizations as the Research Corporation of the General Motors Corporation, the research staff of the Eastman Kodak Company, the General Electric Company's organization, and the tremendous personnel of the American Telephone and Telegraph Company's staff. In the trade association group, the value of the Research Laboratory of the National Canners Association is now unquestioned by any of the members of that organization. Its pioneer work in the fundamental and basic principles of canning has established once and for all time the principles and practices which must be

followed in the successful conduct of the art of canning. The research laboratory of the Glass Containers Association is another illustration of the successful conduct of a research laboratory by a trade association. All of these organizations, whether organized and directed by a single corporation or by an association, are expensive and are not the only method by which research in industry may be developed. With recent years the establishment of the Mellon Institute for Industrial Research at Pittsburgh has opened up another excellent method for the conduct of industrial research. This work is conducted on a fellowship basis which is financed either by individual corporations or by trade associations, and the problem on which work is to be done is indicated by the donor of the fellowship. Many valuable contributions to our industrial life have resulted from this system. In fact, this principle has been extended so that research fellowships of an industrial character have been established at a number of our colleges and universities. Furthermore, the organization of the National Research Council is available for the formulation of research programs and advice and guidance in their development. The National Research Council not only is actively engaged in this direction, but is also taking a leading part in coordinating and encouraging research in the field of pure science. As Mr. Hoover said in his opening of the campaign for an endowment fund of $20,000,000 for the National Research Council, "Applied science itself will dry up unless we maintain the sources of pure science. We must add to our knowledge for the intellectual and spiritual satisfaction that comes from widening the range of human understanding and for the direct, practical utilization of these fundamental discoveries."

In all that I have said thus far I hope that I have impressed upon you the absolute necessity for and dependence of business upon research, and that any business which is to be successful must depend for its progress on research. As Dr. Little so aptly said, "The price of progress is research, which alone assures the security of dividends." In considering the application or development of a research program for the mayonnaise industry, it is not my purpose to advocate the establishment of a research laboratory or organization for your association, nor is it my purpose to recommend the expenditure of large sums for the prosecution of individual pieces of research. As business men, I believe it is a part of your business at least once a year if not oftener to take stock, in other words to make a summary of your raw materials, finished goods, equipment, and other items incidental to the operation of your business.

In the manufacture of mayonnaise certain basic ingredients are used. These basic ingredients are edible oil, egg, vinegar, and spices. Each of these components of your product has its own peculiar problems, which fact is well recognized by those who are primarily concerned with their production. Each of these basic ingredients, however, has many uses in the food field other than its application to your industry. It is, then, pertinent to look into those special qualities of each of these ingredients which will best adapt themselves to your own purpose. This can only be done by bringing together the experts in mayonnaise to confer with the experts who are specifically concerned with these various ingredients. I would, therefore, suggest that through your Research Committee, subcommittees be created which, of course, must include representatives of the industries concerned in their production. These subcommittees can then very carefully study the present status of our scientific knowledge regarding these special commodities and can then agree on a number of problems, the solution of which will be of direct benefit to your industry. Such a stock-taking of knowledge and our needs is only an application of business principles to scientific work, and will enable you to direct your energies and funds in the direction in which they are most immediately needed. Furthermore, such a plan will provide needed coordination in research activities in this field. It will enable you to present fundamental problems to the university man who will welcome such an outlet for his activities.

Former President Norris of the American Chemical Society has said, "Wherever great progress has been made the importance of the relationship between academic research and industry has been recognized. * * * The man who is devoting his life to the study of a particular field of chemistry, who is adding to the world's knowledge by research, and who knows the details of what has been done, cannot help but be of the greatest value to the industry based on his specialty. * * * I feel confident that our industries will advance more rapidly when

(*Turn to Page* 43)

Alkaline Earth Stearate Emulsions

A Study of Some Properties of Water in Oil Emulsions Formed by Soaps of the Alkaline Earths

By ALAN PORTER LEE and JOHN E. RUTZLER, JR.

Introduction: It is well known [1;2] that soaps of the alkaline earths give rise to emulsions of water and oil in which the oil is the continuous phase and water the disperse or discontinuous phase.

This investigation was planned in order to study some of the properties of the alkaline earth stearates in relation to their respective positions in the periodic arrangement of the elements according to Mendeleef. At the outset, the authors believed that the properties of the alkaline earth stearates as emulsifiers would show a continuous variation from Mg. to Ba. The investigation was undertaken, therefore, to prove that continuous variations do occur, and to determine what were the amounts of some of these variations.

Theory

All emulsions consist of a disperse phase in a dispersion medium. Various theories [3;4] have been advanced concerning the mechanism by which emulsions come into being, and what factors determine which phase is disperse and which continuous. The character and amount of the peptizing agent, as well as the character and amounts of the two compounds of the system, determine the kind of emulsion which will be produced as well as its properties. The type of emulsion with which we are dealing can be illustrated very well as in Fig. 1.

The alkaline earth stearates, being more easily wetted by oil than by water, form the hydrophobic membrane shown in Figure 1. This hydrophobic membrane may consist of discrete particles or of a tough elastic film[5].

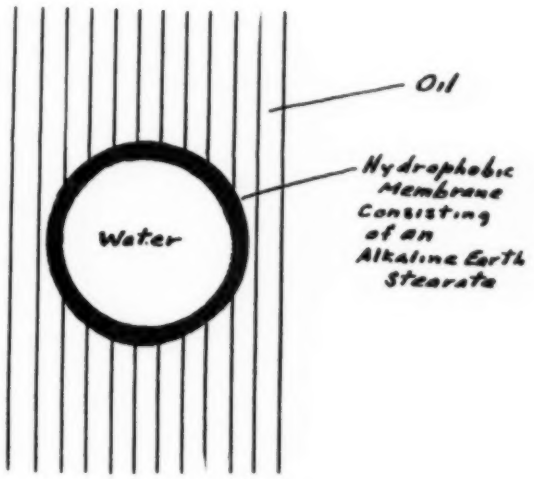


Fig. 1

Graphic Structure of Water in Oil Emulsion

Experimental

The emulsions to be described in this paper are of water in a high grade of refined cottonseed oil (Wesson Oil). Cottonseed oil was chosen in order to extend the study of water in oil emulsions to vegetable oils. Wesson Oil was chosen as a typical highly refined and deodorized oil, so that we might make the results of the study as free as possible from the influence of non-fatty materials, such as coloring matter, albuminous material, resinous and mucilaginous matter.

The alkaline earth stearates were all prepared from a large sample of sodium stearate by double decomposition with the pure chlorides of the alkaline earths. The stearic acid from which the sodium soap was prepared was U. S. P. material.

In order to avoid entrainment of sodium soap in our alkaline earth soaps, the sodium stearate was dissolved in water, the solution brought to a boil and solutions of the alkaline earth chlorides added in excess to separate portions of the sodium stearate solution. Each alkaline earth stearate, after a period of sedimentation, was separated by filtration, thoroughly washed with warm water, and completely dried in a hot air bath. All emulsions herein described were prepared by identical methods, and under the same conditions. Each portion of alkaline earth stearate was added at 25°C. to fifty grams of Wesson oil from a freshly opened tin. Each emulsion was prepared in a 400 ml. beaker, under the following procedure: the Wesson oil,

to which the desired quantity of alkaline earth stearate had been added, was placed in the beaker, after which fifty millilitres of water at 25°C. was added. The beaker was placed in a definite position under a high-speed agitator of the soda-mixer type, and the system agitated for three minutes as timed by a stop-watch.

A set of five emulsions containing respectively 0.001, 0.002, 0.004, 0.005, and 0.006 gram-molecules of magnesium stearate was prepared by the method above-described, for the purpose of studying the variation of stability in relation to the quantity of peptizing agent. A fifty millilitre portion of each of these emulsions was placed in a 50 ml. Erlenmeyer flask and stored, tightly corked, on the laboratory bench, for observation.

Next a set of four emulsions was prepared, using equimolar quantities of the stearates of calcium, magnesium, strontium and barium. After preparation each emulsion was allowed to stand for exactly fifteen minutes, and its viscosity immediately determined. The emulsions were prepared under constant temperature conditions, so that the viscosity could be measured at the same temperature for each, in order that comparative results could be obtained. The viscosimeter was a simple pipette, which was clamped in a vertical position. The volume between the two working marks of the pipette was 20 ml. The emulsions were drawn into the pipette and the time of outflow between the two marks was recorded.

General Observations

A phase examination[6] by the method of T. R. Briggs showed that each of the emulsions herein described was of the water in oil type. The interface: cottonseed oil—water, was found to be convex toward the water. The soaps with which we dealt were found to concentrate at the interface of the two liquids.

The solubility of the magnesium and strontium stearates in the cottonseed oil used in these experiments were found to be nil at 25°C. Spectroscopic traces of the metals were observed, however, in the oil which had been used for the solubility tests.

It was found that the greater the amount of magnesium stearate used to peptize the water into the oil, the greater was the stability of the emulsion thus formed, (see Table I and Curve I). This variation as measured by the amount of oil found above the emulsion cream after fifteen days has been plotted against the number of gram mols of soap used.

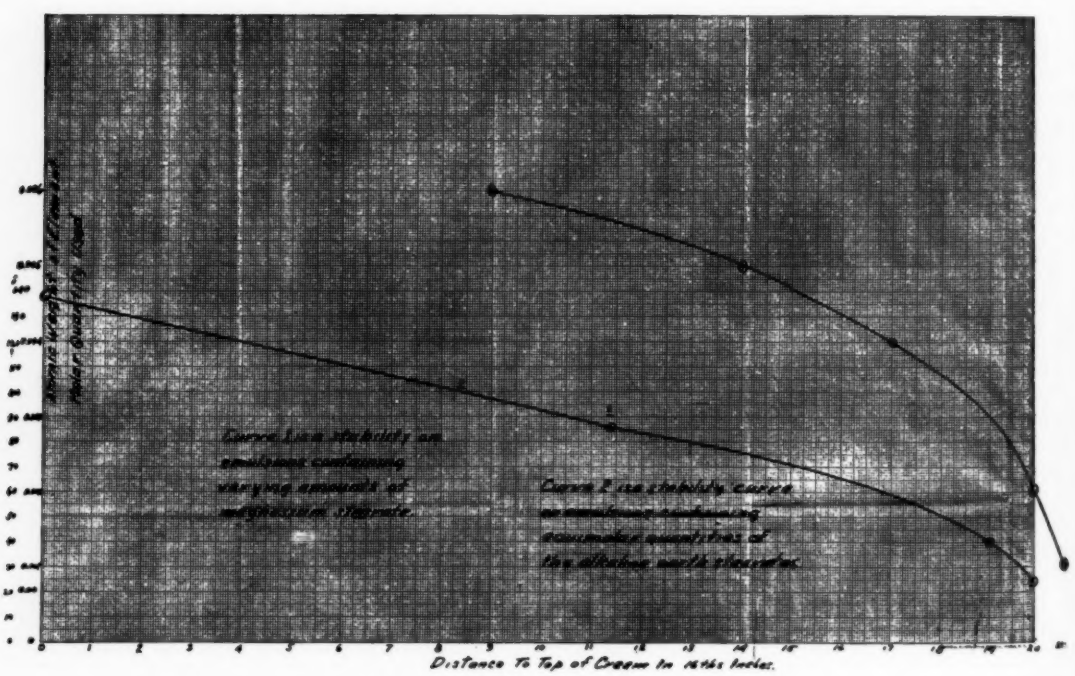


Fig. II
Curves 1 and 2.

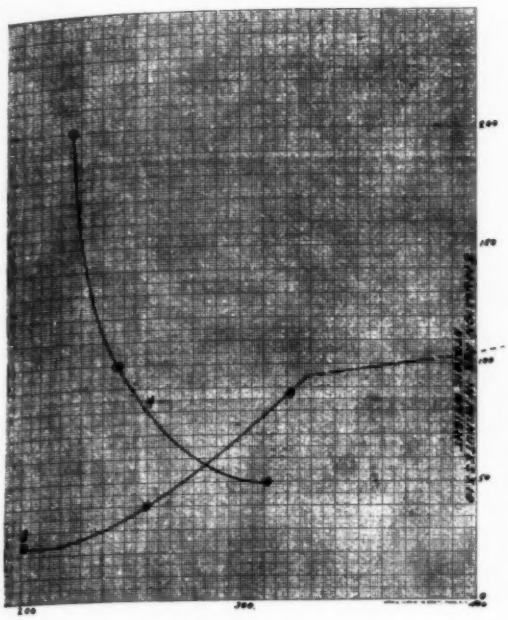


Fig. 3
Curves 3 and 4.

When these emulsions creamed a two layer system was formed. The upper layer consisted of cottonseed oil which apparently contained colloidally dispersed metallic stearate. The lower layer was found to consist of a coarse emulsion of water in oil.

Table I.

Stearate	No. gm. mols.	Distance to top of cream in ins./16
Mg	0.001	21
Mg	0.002	20
Mg	0.004	17
Mg	0.005	14
Mg	0.006	9

Since the curve plotted from this data shows a tendency to flatten out, it appears as if there is a concentration of magnesium stearate above which the stability of the emulsion is not increased by increase of the soap concentration. It is questionable whether or not the emulsion stability will decrease after this point is passed. In other words, will an excess of the peptizing agent cause the drops of water to coalesce?

The emulsions formed by the use of the different alkaline earth stearates showed an increasing relative viscosity in passing downward in the second group of the periodic table.

Table II.

Stearate	Atomic wgt. of metal	Time of flow in seconds
Mg	24.31	201.6
Ca	40.07	259.8
Sr	87.63	321.0
Ba	137.37	5756.0

In curve 3 the above data is plotted using the atomic weights of the metal as abscissae and the times of flow in seconds as ordinates. The curve shows a more or less regular variation for the first three metals, but the barium stearate emulsion was found to have a relative viscosity out of all proportion to the atomic weight of the metal. A possible explanation of this is that the peptizing ability of the barium stearate may become specific. It appears to be much greater than that of the other stearates tested, for the only truly stable emulsion over a period of fifteen days, of all prepared in these experiments, was that in which the peptizing agent was the barium stearate.

The stabilities of the emulsions made with the aid of the different alkaline earth stearates were found to vary progressively with the increase in atomic weight of the metal, as illustrated in Table III, following.

Table III.

Stearate	Atomic wgt. of metal	Molar quantity	Distance to top of cream in ins./16
Mg	24.32	0.004	20
Ca	40.07	0.004	19
Sr	87.63	0.004	11
Ba	137.37	0.004	0

It is thus apparent that magnesium and calcium stearates peptize water into water in oil emulsions which are less stable than those formed by the use of strontium and barium stearates. This of course, does not necessarily occur under conditions other than those under which these experiments were conducted.

The varying stability of the emulsions prepared with the different alkaline earths as peptizing agents is shown in Curve 2, in which the atomic weights of the metals are plotted against the distances to the tops of the creams.

Experiments have shown that the relative viscosity of each of at least two of these emulsions varies continuously for a short time after preparation. Some preliminary data has been taken on this point in the case of one emulsion containing strontium stearate. The following Table IV illustrates this point.

Table IV

Temp. °C.	Stearate	Gm. mols. taken for emulsion	Age	Time of Flow
19.5	Sr	0.004	5 min.	311.4 sec.
19.5	Sr	0.004	10 min.	247.2 sec.
19.5	Sr	0.004	20 min.	226.8 sec.

Age of the emulsion here refers to elapsed time from the end of agitation to the time of starting the relative viscosity test. Plotting ages as ordinates against times of flow as abscissae we obtain Curve 4, which appears to be asymptotic to an ordinate. This must be caused by the system not having reached equilibrium at the time the readings were made. In other words, the disintegrating action of the strontium stearate is less than that of the agitator. It is planned to study this point further in the future.

Conclusions

Considering the conditions under which these emulsions were prepared and from the facts brought out about them, we believe, with Bancroft and others, that the peptizing action of these soaps is due to their concentration at the liquid-liquid interface and to the subsequent formation of a tough elastic film of particles of the soap around the drops of water. From the character of the soaps dealt with, it appears to us that the hydrophobic film consists of discrete particles. The variations found in viscosities can be explained upon the assumption that there is difference in the water particle size under the different conditions. The solubility of the soap in the oil can take but little, if any, part in determining the character of these emulsions, for the work was done with concentrations far in excess of the solubilities of the several soaps at the temperatures employed.

References
[1] Newman, J. Phys. Chem., 18, 40(1914).
[2] Bancroft, "Applied Colloid Chemistry."
[3] See Freundlich, "Colloid and Capillary Chemistry," for an extensive list of references.
[4] See Holmes, "Laboratory Manual of Colloid Chemistry" for a concise explanation of several of these theories.
[5] Pickering, Kolloid Zeit. 7, 11(1910).
[6] Newman, J. Phys. Chem. 18, 40(1914).

Committee Hearing on Codliver Oil

During the past week the Ways and Means Committee of the House of Representatives has continued consideration of the arguments for and against increased duties on animal and vegetable oils and related products. The proposal to place a duty of 45 percent ad valorem on codliver oil and cod oil, first made during the hearings on schedule I, came up again during consideration of the free list and was argued at length by domestic producers and by importers. Dr. H. F. Taylor, speaking for the Atlantic Coast Fisheries Company and for the United States Fisheries Association, was the principal speaker in behalf of the 45 percent rate. The discovery of vitamins some three years ago started the cod liver oil industry in this country, he said, describing the American industry as an infant needing protection. With adequate protection, Dr. Taylor said, the American fisheries could produce 20 percent of the domestic demands with the present catch of cod and haddock, and could greatly increase this through development of fisheries in the cod banks of the Pacific and of Alaska. The price of a dose of cod liver oil to the consumer, he said, is largely the same, regardless of wide fluctuation in the wholesale price of the oil, declaring that the proposed duty would not be a burden on consumers. Dan Sutherland, Delegate in Congress from Alaska, also supported the proposed duty on cod liver oil, declaring that it would develop the now untouched cod banks of the North Pacific American waters, which, he said, are more extensive than those of any other nation.

Opposition to a duty on codliver oil was expressed chiefly by James Campbell Lewis, for E. R. Squibb & Sons. Mr. Lewis stated that because of the enormous increase in the demand for cod oil and codliver oil, his company went all over the world and put in extracting plants in every fishing port where enough cod were brought in to make a plant pay, but he is still doubtful that the needs of the United States, which already uses three-fourths of the world's production, can be supplied. Mr. Lewis offered, on behalf of his company, to buy the entire codliver oil output of all who asked the imposition of the duty, and he also expressed willingness to enter negotiations for developing cod fisheries in Alaska as a future supply for oil. He asserted that American producers of codliver oil are now receiving a price 100 percent greater than their production cost. Mr. Lewis was supported in his arguments by C. P. Gulick, for National Oil Products Co., Harrison, New Jersey, who declared that the greatest annual domestic production of codliver oil was only 6 percent of domestic consumption and that the potential capacity of the domestic industry is only 3 percent of the potential domestic demands for poultry feeding alone.

Final briefs in the linseed oil investigation were filed recently with United States Tariff Commission by John B. Gordon, Bureau of Raw Materials for the American Vegetable Oils and Fats Industries, seeking a reduction in the duty, and by C. T. Nolan, for the domestic linseed crushers, seeking a retention of the present duty of 3.3c on linseed oil.

United States Exports of Fats and Oils Decrease

Foodstuffs Division Reports Slight Increase in Lard Exports, but Declines in Other Important Fat Shipments

IN THESE days of consideration of greatly increased tariffs on oil and fat products, it is not entirely amiss to consider the trend of American exports of animal and vegetable oils and their developed products. The Foodstuffs Division of the Department of Commerce, in a recent issue of *Commerce Reports*, gives complete figures on the United States exports of all foodstuffs during the calendar years of 1927 and 1928.

The figures given for the fats and oils show material decreases for 1928 in the exports of all important fat and oil products with the sole exception of lard, which increased 11.5 per cent in quantity, but only 7.2 per cent in value, which indicates a decrease of about 4 per cent in the average value of our exported lard for 1928 as compared with 1927. Shipments of lard to the United Kingdom, our leading market, accounted for much of the year's gain, and there were also gains in the trade with Poland, Italy, France, and Finland. Lard shipments to Germany, however, declined considerably during the year, while there were increases in those to Mexico, Cuba, and Central America. Exports of other animal fats, with the exception of neutral lard, decreased considerably during the year, an example being the drop of 51.5 per cent in quantity and 49 per cent in value in shipments of tallow.

Shipments of cottonseed oil, both crude and refined, declined about 24 per cent in quantity and 22 per cent in value. The decrease occurred largely in exports to Canada and Cuba, while those to Mexico were increasing. Exports of lard compounds decreased 47.6 per cent in quantity and 43.4 per cent in value, and oleomargarine shipments declined 19.1 per cent in amount and 17.1 per cent in value. Exports of miscellaneous vegetable oils and fats, (representing small quantities of corn oil, cocoa butter and others), increased 32.5 per cent in quantity and 60.6 per cent in value, but the total volume of these miscellaneous oils and fats totalled only 1.3 per cent of the total quantity of oil and fat exports for 1928, and only 1.7 per cent of the total value.

Dairy butter, the product of our dairy farms and creameries, is also falling behind in the competition for the trade of the world, particularly of those South American and West Indian countries whose lack of pasture lands prevents home production of milk and its products, for our exports of butter in 1928, (as compared with those in 1927), declined 10.3 per cent in quantity, and 7.5 per cent in value. Exports of cheese likewise fell off heavily, declining 23.8 per cent in quantity and 22.4 per cent in value.

Total exports of all vegetable oils decreased 17.3 per cent in quantity and 6.4 per cent in value during the year, as compared with the previous year. Total exports of animal oils and fats increased 6 per cent in quantity and 4 per cent in value, which increase was entirely attributable to the increase in lard exported, as noted above. Eliminating lard from consideration, total other animal oil exports decreased 20.3 per cent in quantity and 14.6 per cent in value during the year.

Exports of feeds and fodders composed of cottonseed cake or meal and of linseed cake or meal also fell off materially during the year 1928, the only increase in commodities of this character being recorded in 'other oil cake and meal,' a small percentage of the total. Shipments of cottonseed meal and cake declined 34.1 per cent in quantity and 19.2 per cent in value during the year, while those of linseed cake and meal decreased 15.4 per cent in quantity and 3.1 per cent in value.

Complete figures on the exports of animal and vegetable oils and fats and products and oil cake and meal for 1927 and 1928 follow:

(Units and value in thousands, 000 omitted)

Commodities	*Quantity*		*Value*	
	1927	1928	1927	1928
Animal fats and oils:				
Lard .....pounds..	681,303	759,722	92,035	98,700
Neutral lard .....do....	20,397	23,750	3,003	3,225
Lard compounds ..do....	8,988	4,713	1,084	614
Oleo and lard stearin .....do....	5,648	3,882	597	437
Oleomargarine ...do....	796	644	129	107
Oleo oil .....do....	78,181	62,779	9,599	8,281
Oleo stock .....do....	11,913	6,778	1,378	802
Tallow .....do....	6,610	3,211	563	287
Vegetable oils:				
Cottonseed oil—				
Crude .....do....	51,407	41,127	4,184	3,456
Refined .....do....	16,575	10,576	1,754	1,201
Other vegetable oils and fats ...do....	9,159	12,144	1,355	2,177
Dairy products:				
Eggs in the shell .....dozen..	28,707	20,192	7,738	6,135
Butter .....pounds..	4,343	3,898	2,010	1,860
Cheese .....do....	3,410	2,600	1,028	798
Feeds and fodders:				
Cottonseed cake ..do	623,371	409,621	11,498	9,106
Cottonseed meal ..do....	257,728	171,397	4,465	3,806
Linseed cake .....do....	645,356	547,475	13,480	13,085
Linseed meal ....do....	16,941	14,133	352	329
Other oil cake and meal .....do....	25,572	44,308	391	869

N

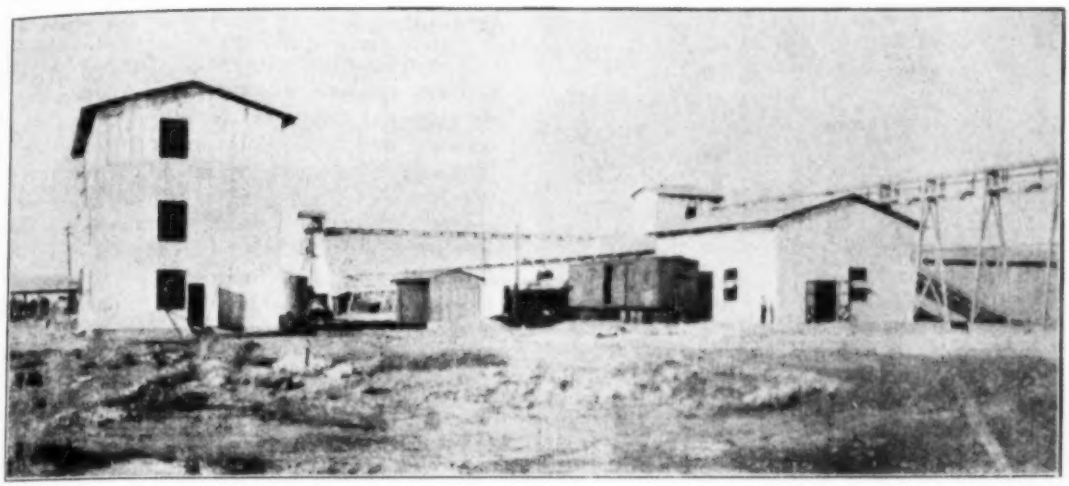
T

many
The S
a most
now p
ton se
lishing
oil ref
this re
lion do
valley
other
Gro
the pla
pany a
its ann
lion d
proach
The
produc
pany's
amoun
new re
ditiona

New Cotton Oil Refinery for California

San Joaquin Company Installs Facilities to Handle Output of its Chowchilla and Bakersfield Mills

By Charles W. Geiger



General View of Plant of San Joaquin Cotton Oil Co., Chowchilla, California

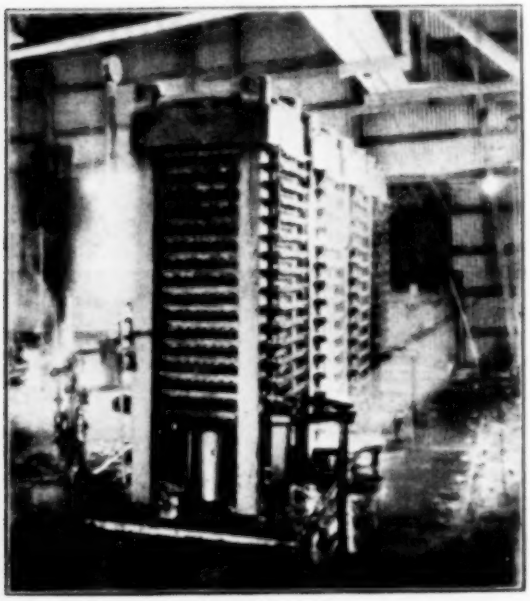
THE cotton and cotton oil industries of California and of the San Joaquin Valley particularly are growing apace, as evidenced by the establishment of many new gins and oil mills in that territory. The San Joaquin Cotton Oil Company has been a most important factor in this growth and have now proved themselves the leaders in the cotton seed oil business in their territory by establishing the San Joaquin Valley's first cotton oil refinery at Chowchilla. The installation of this refinery means that more than half a million dollars worth of cotton oil produced in the valley will be refined at home, instead of at other points in California, as formerly.

Growing steadily during the past few years, the plant of the San Joaquin Cotton Oil Company at Chowchilla has reached the point where its annual payroll exceeds a quarter of a million dollars and the value of its products approaches a million dollars each year.

The mill at Chowchilla now has an annual production of sixty tank cars and the company's mill at Bakersfield is producing an equal amount. All of this oil will be handled in the new refinery at Chowchilla, together with additional oil to be purchased from other mills. The linters from these mills are disposed of in the usual linter markets, while the cake, meal and hulls find a ready market for cattle feeding in California and Nevada. Madera and Merced Counties, California, which are located in the San Joaquin Valley, offer a particularly favorable market for these feedstuffs, as together they comprise one of the most important stock-raising and feeding sections of the state.

The stockholders and management of the San Joaquin Cotton Oil Company have demonstrated their faith in the future of the cotton and cotton oil production possibilities of the San Joaquin Valley over a period of years by the investment of over three-quarters of a million dollars in their oil mills, refinery and ginning stands. The company has also encouraged the growth of cotton in the valley by a system of crop loans and financing of growers which involves the use of an additional million dollars of working capital.

There are 153,600 acres of land planted to cotton in the San Joaquin Valley this year and it is estimated that at least three times this much first class cotton land is available in the area. The growth of the cottonseed oil industry



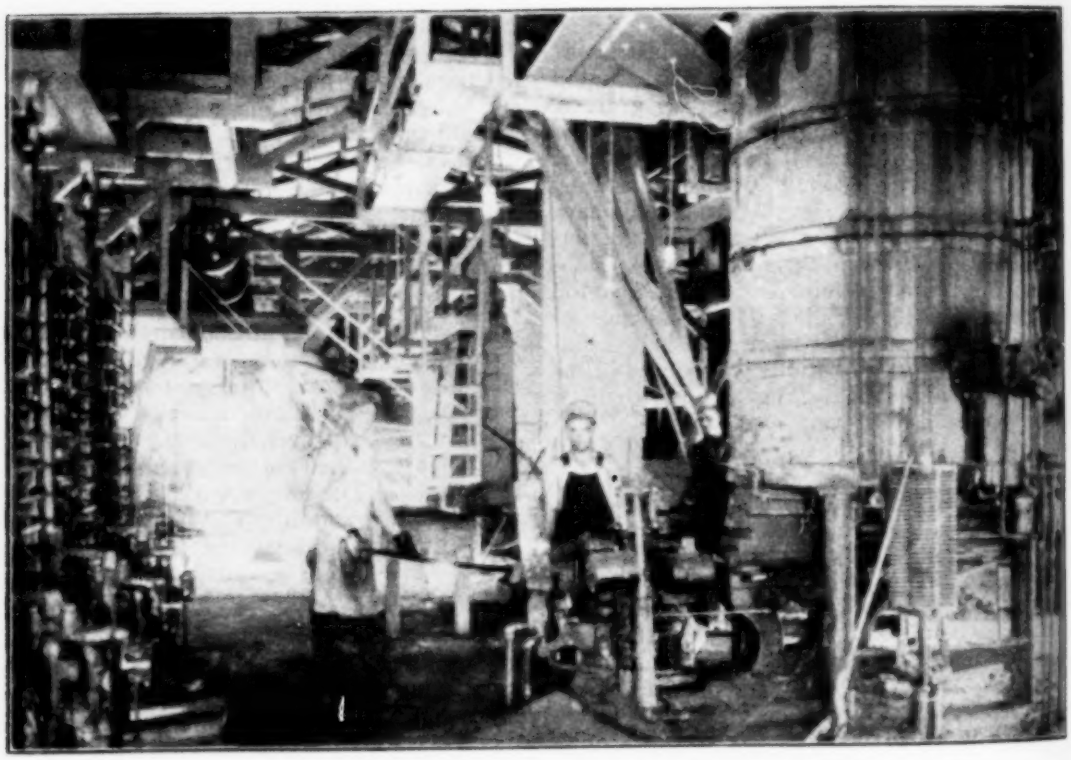
Battery of Hydraulic Presses

should be considerable, therefore, during the years to come.

The equipment of the San Joaquin Cotton Oil Company's Chowchilla plant, as shown in the accompanying illustrations, is of the most modern type, and quality and yields are controlled by the mill's own chemist, who is shown at work in his laboratory.

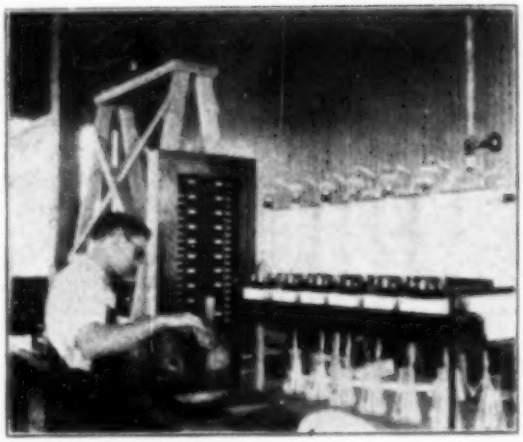
The mill is equipped with a four-high cooker, with automatic former, as shown in the illustration at the bottom of this page. The hydraulic presses are equipped with automatic change valves, and the San Joaquin Cotton Oil Company reports extremely favorable results in press-room work.

The refinery at present produces only prime summer yellow oil, but the owners plan to develop the property for the production of cooking and salad oils and compounds at a later date. As shown in the illustration at the bottom of page twenty-three, the refinery consists of: a neutralizing tank, equipped with Perfect circulation, variable speed machine and direct motor drive, soapstock receiving tank below the neutralizing tank, and large heating and settling tank, (shown at the lower right hand corner of the illustration). The caustic soda supply tank may be seen in the extreme upper left. The refinery is also equipped with a filter press, (not shown in the illustration), for filtration of the finished prime summer yellow cottonseed oil.

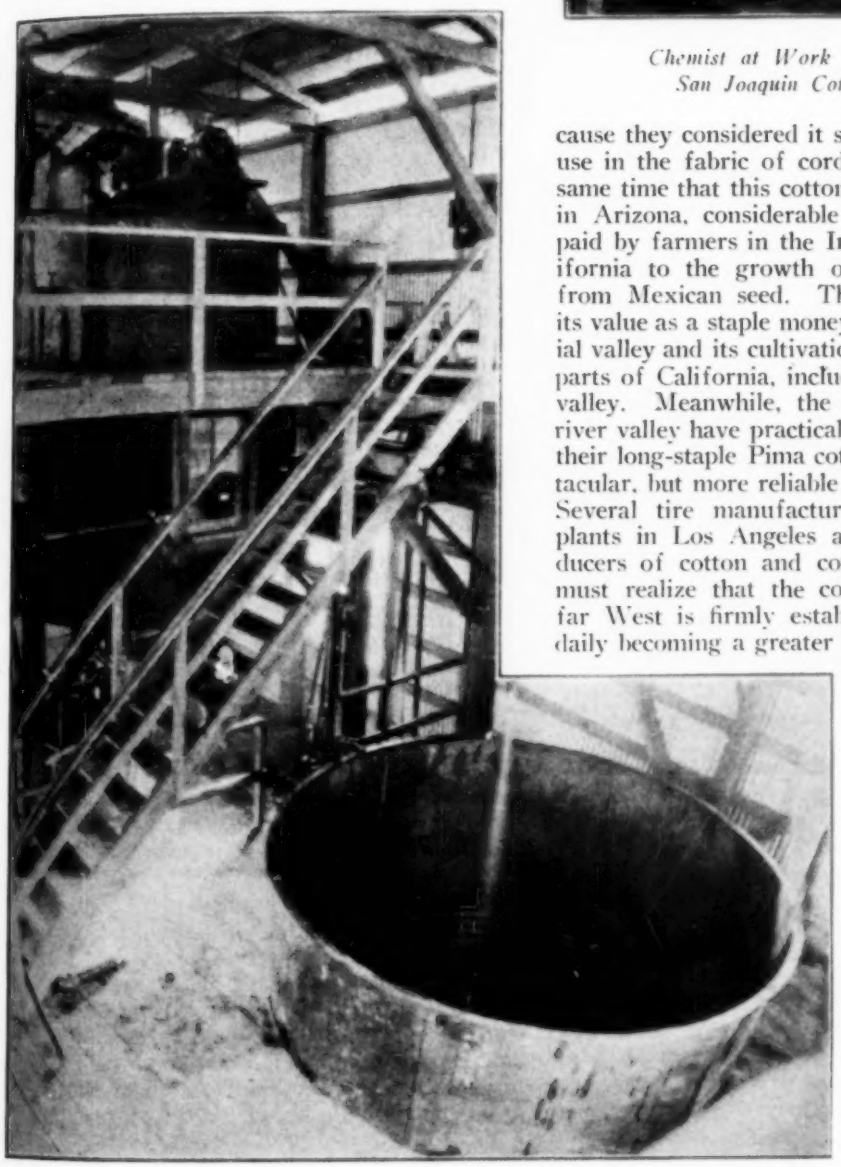


General View of Pressroom, Showing Cooker and Cake-Former

The cotton produced in the San Joaquin valley is of the standard short-staple type similar to that known as Upland cotton in the Southeastern states. The development of cotton growing in the far Western states has had a romantic history dating from only a few years ago when the great Roosevelt dam in Arizona was completed, opening up the desert lands in the Salt river valley to cultivation. The first cotton produced in the Salt river valley was of the Egyptian long-staple type, and after considerable experimentation a grade known as Arizona-Egyptian, or Pima cotton, was produced. The great rubber companies fostered the development of this grade of cotton, because they considered it superior in quality for use in the fabric of cord tires. At about the same time that this cotton was being developed in Arizona, considerable attention was being paid by farmers in the Imperial valley in California to the growth of short-staple cotton from Mexican seed. The crop demonstrated its value as a staple money-maker in the Imperial valley and its cultivation has spread to other parts of California, including the San Joaquin valley. Meanwhile, the growers of the Salt river valley have practically entirely abandoned their long-staple Pima cotton for the less spectacular, but more reliable short staple varieties. Several tire manufacturers have established plants in Los Angeles and the Eastern producers of cotton and cottonseed oil products must realize that the cotton industry of the far West is firmly established and that it is daily becoming a greater factor in the market.



Chemist at Work in Laboratory, San Joaquin Cotton Oil Co.



Refinery (interior view) San Joaquin Cotton Oil Co., Chowchilla, Calif.

Late Tariff Questionnaires Analyzed

AFTER the February issue of *Oil & Fat Industries* had been published, a number of additional questionnaires on the oil and fat tariff were returned to the publishers. These, of course, arrived too late to be included in the original discussion of this subject, but have been analyzed and the facts are given herewith. Of the total received late, 53 per cent were opposed to the tariff and 47 per cent in favor of it. The latter were mostly peanut and cotton oil producers and the former coconut oil crushers and refiners, manufacturers of margarine, lard compounds, etc. One producer of lard, lard compound, shortening fats, salad oils, stated that he was "neutral" and that the tariff as proposed at 45 per cent would have no effect on his business. Most of the reasons given against the tariff included the fact that it would cause a material reduction in consumption due to high prices. The chief reason given in favor was that it would create a better demand for American crushed oils, with consequent higher prices to the crusher and to the farmer for his seed. Proposed tariffs were suggested all the way from 1c on crude oils and 2c per pound on refined oils up to 7c and 8c per pound and 50 per cent. Practically all replies agreed that some kind of tariff was needed, but varied as to what was equitable according to the type of business from which the reply came.

Some interesting excerpts from several replies are given herewith. A cotton oil crusher says:—"Unless the Philippine importations are taxed, the whole tariff measure will be invalidated as a protective measure, because our imports from these Islands last year were the equivalent of 1,217,000 bbls. of coconut oil. According to an estimate made by a representative of the Department of Commerce in 1925 —'By 1930 the Philippine production of cocoanut oil and its equivalent in copra will be more than 2,000,000 bbls.' At the same ratio of increase, by 1935 the Philippine production will amount to as much as our present production of cotton oil in the South.

Further, while we hold the Philippine Islands as wards, and our obligation is to give them a good and stable government, our obligations do not compel us to share with them our American markets in which American white men, living under American standards of living must make a living in producing both animal and vegetable fats. Further, there is no constitutional reason why we should not tax the Philippines because in the treaty with Spain in which we took over the Islands, it was specifically provided that we treat them as any other foreign country in levying tariff duties and they in turn should treat us likewise. Further, for the first ten years of our occupancy of the Islands, we did tax them as any other foreign country, save and except that we did grant them a 25% preferential rate.

We believe a rate of 45% Ad Valorem is justified, but we would have a specific rate of duty equalling 45% on basis of the average price for the past six years, which would approximate practically 3½c per pound, but not less than 45% Ad Valorem. On refined oils, we are in favor of an increased tariff commensurate with the cost of refining and with the crude oil tariff."

An oil consumer states: "To put into effect the duties that have been asked for would mean nothing less than a tragedy to the laundry soap industry of this country and this would be accomplished without benefiting the farmers or the edible fat industries. In this tariff consideration laundry soap manufacturers, and other technical users, should be set apart from the manufacturers of edible products, and all fats and oils for the soap kettle, etc. should be admitted free."

A Pittsburgh manufacturer says: "It is extremely foolish for manufacturers of compounds, mayonnaise and soap to oppose an increase on the tariff of raw materials. An increase on the tariff of raw materials would increase the cost of their finished product, and increase the selling price of their finished product. There is no business condition in which it is not better to do business on a high scale of prices than a low scale. Witness our prosperity during the war and in 1920 when prices were high.

This question has been up in a similar manner on Flavoring Extracts and Perfumes—particularly on Flavoring Extracts. At one time there was a price of $4.12 per gallon on alcohol used in Flavoring Extracts, which being a considerable factor in their cost required a high retail price. Many manufacturers preferred to do business on this basis because they held their percentage of profit the same as before and made more dollars than they had made when there was no tax on the alcohol to speak of.

In my opinion it would be an inestimable benefit to all the meat industries, tallow ren-

derers, oil refineries, farmers, and manufacturers of finished products containing oils and greases, if this tariff raise was put through, providing, of course, that the finished product was protected in the like manner. A business doing $5,000,000.00 a year, figuring on a net profit of 10% would naturally increase in volume to a business of $7,500,000.00 a year, making the same percent of profit. Owing to the larger investment the earnings would increase by $25,000.00. People eat only so much food anyhow, and they use only so much soap anyhow. Records will prove that this is the case —no matter at what price it is sold. It would, therefore, benefit all the above classes of people. Some trade, such as the laundry trade, might suffer, but it would not take them long to advance the prices of washing goods a cent apiece or so, and join the rest of the beneficiaries of this increase in price.

Why should the American people support millions of negroes, Chinese, Malays, nad foreign countries who do not wish to pay their debts, by spending millions each year for coconut oil, palm oil, etc., which are sent to this country to compete with our domestic fats and oils? The duty on steel is 50%—why should not the duty on fats and oils be 50%? Why should one manufacturer be penalized at the expense of another? There are so many millions of people in this country whom this tariff would benefit that I have no doubt it should be passed."

A California company states: "The olive oil situation is simply this. Imported oils are underselling California oil, due to the fact of cheap harvesting and producing labor in Mediterranean countries. Our farmers growing olives for oil cannot compete with these low wages. Moreover many of the workers in the olive oil producing plants often are of direct Mediteranean extraction. At the wages we pay for this labor, they cannot afford to buy back our oil. We would like to pay higher wages and give more continuous employment. As it is, we are forced to lay off men due to inability to obtain sufficient olives. The farmers are gradually reducing their acreage of oil olives.

This condition is brought about by low labor costs in the Mediterranean countries. Though we pay high labor wages, in fact ten times what Europe pays for similar work, it is insufficient to stimulate oil olive growing and production. We do not worry about our business if the wage income in the industry all along the line can be raised. We heartily appreciate this opportunity to express ourselves through your valuable journal."

Further Hearings at Washington

Washington, D. C., Mar. 1, 1929. The Ways and Means Committee of the House of Representatives has now concluded its hearings relative to revision of the tariff on oils and fats, and has heard a voluminous mass of testimony favoring each side of the controversy. Among those who appeared before the last session of the committee were: E. R. Crawford, President of the McKeesport Tin Plate Company, who protested against a duty on palm oil, declaring that no other oil can take its place in the tin plate industry; J. A. Ryan, of C. F. Simonin's Sons, Inc., who asked a duty of 45 percent on sesame oil when it is imported for edible purposes, saying that sesame oil is not an industrial oil, but is a salad oil and comes into direct competition with domestic cottonseed and corn oils; and Charles W. Holman, secretary of the National Co-operative Milk Producers Federation, who advocated the policy of making products imported from the Philippines dutiable the same as those from any foreign country. Mr. Holman referred particularly to copra and coconut oil which are the particular targets of the dairy interests and said, in part; "I believe we are the only country in the world that permits a colony or dependency to have a preferential duty on a manufactured product. The policies of European countries are to bring in the raw material, and with respect to coconut oil and copra we have developed what seems to us to be an uneconomic condition in that we have fostered an oil crushing industry in the Philippines by means of a tariff, when the whole economics of our position would call for the movement out of that country of copra alone." Mr. Holman stated that the key to the solution of the fats and oils tariff problems is in the Philippine Islands, and pointed to the great potential production of coconut oil there as a menace to American vegetable oils and butter. Mr. Holman's arguments were opposed by several representatives of Philippine interests, among them being: Newton W. Gilbert, representing the Philippine-American Chamber of Commerce of New York, Pedro Guevara, Resident Commissioner of the Philippine Islands, and General Frank McIntyre, American Trade Commissioner of the Philippine Government.

Copra crushers, including Duval Moore, of the Eldorado Oil Works, San Francisco, and John W. Barker, of the Portland Vegetable Oil Mills, Portland, Oregon, declared that between the demands of the soap manufacturers for duty-free coconut oil and the demands of the farmers for a tariff on copra, it looked like the death of the copra industry.

Solubility Tests of Castor Oil

By H. P. Trevithick and M. F. Lauro
New York Produce Exchange

CASTOR oil, as is well known, is completely soluble in alcohol, while all other vegetable fats are practically insoluble. Based on that fact, one of the most obvious and simple tests for the purity of castor oil is the determination of the solubility of a sample of the oil in alcohol. Various specifications for the test have been given by different authorities, using various proportions of oil and alcohol, and varying strengths of alcohol.

Thus the U. S. Pharmacopoeia IX. Edition, page 299, specifies equal volumes of 95% alcohol and castor oil. The Signal Corps U. S. A. specifications are four volumes of 90% alcohol to one of oil. Still others require that one part of oil shall be soluble in two parts of 90% alcohol and again in two parts of 95% alcohol. All authorities require complete solubility in dehydrated alcohol in all proportions. Lewkowitsch also gives (see Technology of Oils, Fats and Waxes, Fifth Edition, Vol. II, page 399) the following: "It also dissolves at 15°C in two volumes of 90%, and in four volumes of 84% alcohol. For the rapid examination of castor oil (by custom house officers) Finkener recommends agitation of 10 cc. of the sample with 50 cc. of alcohol, of the specific gravity of 0.829 at 17.5°C, in a graduated cylinder."

While these solubility tests are very valuable, too much stress should not be laid upon them. If the oil dissolves in the alcohol, it is very probably pure. If, however, the oil does not dissolve, particularly in the weaker alcohols, weaker than 95%, it should certainly not be rejected outright as impure, but should be subjected to further analysis for confirmatory proof of its purity or adulteration. In other words, the solubility tests are only sorting tests, with further investigations being needed before an oil can be rejected as impure.

We received samples of oil from four tank cars in 1919 which refused to pass either the Finkener or 90% alcohol solubility tests, analysis of which resulted as follows:

Analyses of Castor Oils which did not pass Finkener Test:

Characteristics	*A*	*B*	*C*	*D*
Sp. gr. at 15.5°C	0.9608	0.9611	0.9607	0.9613
Iodine No. (Wijs)	86.7	87.4	88.3	87.8
Sap. No.	183.6	182.8	182.3	183.2
Refraction at 15°C			1.4801	1.4805
'Viscosity (130°F)			476	480
Free Fatty Acids			2.26%	2.12%
Acid Value			4.5	4.2
Halphen Test			Neg.	Neg.
Acetyl value			148.3	145.0
Solubility Tests:				
Glacial Acetic Acid			Clear	Clear
Absolute Alcohol (All proportions)			Clear	Clear
95% alc-1:2	Clear	Clear	Clear	Clear
90% alc-1:4	Turbid	Turbid	Turbid	Turbid
Petroleum Benzine			Clear	Clear
Finkener Test 1:5.	Turbid	Turbid	Turbid	Turbid

"C" and "D" particularly could not be classed as impure oils, as most all other vegetable oils have very small acetyl values, none exceeding 30.

Sometime later a single tank car shipment of oil was tested by the Finkener method for its solubility in alcohol, and gave a turbidity. The laboratory making the test drew the conclusion that the oil was not pure, and so reported. The question was then placed before the Bureau of Chemistry for decision. Two gallon samples drawn from the shipment by two different sampling agencies, one drawn at point of origin, and one at destination, were received in the summer of 1920. The first sample was analyzed immediately and the second was held and tested ten months later. Below are given the results of the analysis:

Characteristics of a Castor Oil Fresh and 10 Months Later

	No. 1 Fresh	*No. 1 after 10 months*	*No. 2 after 10 months*
Appearance	Clear		Clear
Odor	Castor oil		Castor oil
Color	Good		Good
Sp. Gr. 15.5°C.	0.9602		0.9614
I. No. (Wijs)	89.2		89.3
Sap. No.	181.1		181.2
Acid No.	6.4		6.9
Free fatty acids	3.20%		3.47%
Unsap. Fat	0.58%		0.60%
Refraction 15.5°C.			1.4808
'Viscosity 130°F.	465		473
Viscosity 212°F.	93		95.5
Acetyl No.	148.5		146.2
Sap. No. Acetylated Oil			302
Acid No. Ins.			178.9

	No. 1 Fresh	*No. 1 after 10 months*	*No. 2 after 10 months*
Neutralization No. of F. A.			179.7
Unsapon. in F. A.			0.64%
Halphen Test			Negative
Villavechia Test			Negative
Solubility Tests:			
Petroleum Ether	Clear	Clear	Clear
Glacial Acetic (All Pro.)	Clear	Clear	Clear
Abs. Alcohol (All Pro.)	Clear	Clear	Clear
95% 1:2	Clear	Clear	Clear
90% 1:2	Clear	Turbid	Turbid
90% 1:4	Clear	Turbid	Turbid
Finkener Test 1:5	Turbid	Turbid	Turbid

[1] Viscosity made by Saybolt Universal Viscosi-meter.

It will be noticed that between the time of the two analyses some changes had occurred. The specific gravity had increased .0012 the free fatty acids 0.27, and the viscosity at both temperatures showed a slight increase. Further, whereas the oil passed all the various specifications for the alcohol solubility tests except the Finkener in the first analyses, the second sample was, also, not completely soluble in the 90% alcohol. The original sample, upon retesting at the time of analyzing the second sample, showed the same failure to pass the Finkener and 90% alcohol solubility tests, although it passed the 90% test at the time of the first analysis. As stated by Lewkowitsch in Volume II, page 396 of the Fifth Edition of his Technology of Oils, Fats and Waxes, castor oil does not dry, but it does thicken. This is borne out by the increase in the gravity and viscosity while the iodine value remain unchanged. This thickening may possibly be due to a slow polymerization of the molecule. This is borne out not only by the analysis of the second sample, which had been held a year, but also by the fact that the first sample also had changed the same way, it having passed all but the Finkener test at the time of the first analysis, but showing the same turbidity in 90% alcohol as the second sample when tested ten months later.

Inasmuch as the samples pass all other requirements for pure castor oil, it did not seem that the oil could have been adulterated but that the incomplete and slowly increasing insolubility was due to some inner change of the molecule. This is all the more evident when it is remembered that all oils other than castor oil have very low acetyl values, so that even a 5% contamination with other oils would have reduced the acetyl value below 140, whereas both of the samples showed normal values of 148.0 and 146.5, respectively. Further the portions insoluble in the various alcohols as given above were completely soluble in 95% alcohol, thus offering further proof that the insoluble portion was not vegetable oils, but more probably castor oil.

At the suggestion of I. F. Laucks, we obtained further proof of this theory. A large quantity of the oil was treated with the alcohol, and the insoluble portion was allowed to settle out. This insoluble portion was freed completely from alcohol and water and a portion tested for its acetyl value. Inasmuch as all other oils have values of less than 30 for acetyl value, this insoluble fraction would have a very low acetyl value if the oil had been adulterated. The value as determined, however, was 136, proving conclusively that the insoluble portion was hydroxylated and therefore castor oil and not any other vegetable oil. This acetylated residue also showed an iodine value of 79.4, which is about what would be expected.

We therefore believe that failure to pass the solubility tests for castor oil especially those specifying alcohol of less than 95% strength should not be considered as proof of adulteration, but rather as an indication that further chemical investigation of such a sample is needed to prove or disprove its purity.

Further, while all authors state that the filtration and distillation methods of determining the acetic acid liberated from acetylated oil, give the same results, we have been unable to obtain concordant results by the filtration method. The results are always variable and low. Even if the liquid is cooled before filtering, a loss results. This is probably due to the volatilization of the acid. However, distillation, especially if phosphoric acid is used for acidulating instead of sulphuric acid always gives concordant, and consistent results. This method is used for determining the acetic acid in calcium acetates, and we have found it much better for determining the acetyl value than the use of sulphuric acid. If the liquid being distilled is allowed to concentrate to a volume of 50 cc. or less, the sulphuric acid is liable to char the acetylated oil (particularly that material which spatters the sides of the flask above the liquid), and liberates volatile acids which go into the distillate and vitiate the results. By using phosphoric acid, that danger is obviated and we can obtain consistent results with good checks, whereas by the filtration method we obtained six different values ranging from 125 to 143 on a sample of medicinal castor oil of known purity, and with a true acetyl value of 148 as determined by the distillation method.

Our method is as follows:

Boil gently 20 gr. of filtered dry oil with 20 cc. of acetic anhydride and 10 grams of anhydrous sodium acetate in a round-bottomed 150 cc. flask (attached to an air-jacketed reflux condenser) for two hours, allowing no material to cake on the sides. Cool somewhat and before breaking connections rinse down the condenser with water, adding about 50 to 80 cc. of water. Pour the contents of the flask into 500 cc. of water in a large beaker and boil for 30 minutes, using glass beads or a stirring rod reaching the bottom of the beaker to prevent bumping. Siphon off the water and boil the oily layer with fresh water until the wash water is no longer acid to litmus. Separate the acetylated fat from the water, filter and dry in an oven at 100°C.

Weigh 2-4 grams of the acetylated fat into a 500 cc. Erlenmeyer flask, add 50 cc. of alcoholic potash (40 grs. to the litre) and saponify for one hour. Evaporate off the alcohol and dissolve the soap in water. Fit up the usual steam distillation apparatus using a two-litre flask for the steam boiler and allow the steam to escape from the flask for 15 minutes to insure the removal of carbon dioxide from the water. Acidulate the soap solution of the saponified acetylated fat with phosphoric acid using methyl orange as an indicator, conduct the steam into this liquid, and keep both the flasks boiling. Catch the distillate from the Erlenmeyer flask in 40 cc. of quarter normal caustic solution, being careful that the caustic solution seals the end of the delivery tube. After 400 cc. have passed over remove the receiver and titrate back with acid. Continue the distillation, it not being necessary to use caustic in the receiver but being sure that the delivery tube is sealed in with water. Test each 100 cc. of distillate until not more than 0.1 cc. of quarter normal caustic is necessary to produce a red color with phenophthalein.

The total number of ccs. of quarter normal caustic used to titrate the distilled acid multiplied by 2.5 and by 5.61, and divided by the weight of sample taken, gives the acetyl value. It is better to keep the volume of liquid in the Erlenmeyer flask as small as possible during the distillation to prevent too much splashing, with its consequent carrying-over of the acid solution by entrainment.

Grading of Yellow Glasses

The complete report of the calibration of the sixty-five 35 Yellow Lovibond glasses collected from the members of the American Oil Chemists' Society and submitted to the Bureau of Standards in August, 1927 for calibration will be published in the April issue of the Bureau's Journal of Research. Copies of this paper will be sent to each member who submitted glasses. If any others desire them they can be obtained from the Government Printing Office.

In order to expedite this work the American Oil Chemists' Society employed and detailed to the Bureau of Standards in September, 1927 a research associate to assist in the standardization of glasses. The Bureau has previously examined considerable numbers of the red glasses and disclosed some irregularities of such magnitude as to be of serious consequence in comparison with the small differences which are considered in fixing the market price of the oil. The present report deals with 65 yellow glasses all of nominally the same grade designated as "35 yellow" on the British scale. The glasses were collected by the American Oil Chemists' Society mostly from among glasses in use by its members. Very few new glasses were included. These glasses were submitted to the Bureau by the Society during the month of August, 1927.

The Bureau has conducted a thorough-going, precise intercomparison of these glasses, and reports in detail the true equivalent to be assigned to each glass in using it in careful critical work. It is worthy of note, however, that the errors found in these yellow glasses are negligible in comparison with the uncertainties inherent in the customary methods of using the glasses to grade the oils. An outstanding result of the investigation is the conclusion that the discrepancies in color grading which have disturbed traders in the oils cannot be attributed to errors in the yellow glasses. The origin of these discrepancies is rather to be sought in the following factors: (a) Unstandardized and insensitive methods of comparing the colors of oil and glasses; (b) abnormal color sense and low power of hue discrimination in some users of the glasses; (c) errors in the red glasses. Only after these sources of uncertainty have been eliminated will it be worth while to take into practical account the relatively small errors in the yellow glasses.

Kellogg Quarterly Earnings

Spencer Kellogg & Sons, Inc., have issued an earnings statement for the twelve weeks ending December 22, showing net of $182,777 after all deductions, or 36 cents a share on outstanding no par common stock.

About Selecting a Trade Mark

By Waldon Fawcett

Peculiarities of Oil and Fat Products Cause Frequent Conflict of Grade Marks with Trade Marks

IF AN interested bystander were to hazard a guess, he would say that only one thing threatens to spoil the branding holiday of the oil and fat industries. There is no question but what the entire industry is becoming trade mark conscious at a rapid pace. This is due, in part, no doubt to the fact that we are living in an age of commodity identification. The American public has been taught to "buy brands" to a degree unknown in any land or in any period. But, added to that influence, is the growing realization that vegetable oils and the edible fatty products are well adapted to nicknaming for purposes of recognition. This last awakening is bound up with the modern trend to packaging for the retail trade.

Only one fly in the ointment imperils this current drive for the cultivation of good will in business. There is a dangerous propensity in the oil and fat field to jumble trade marks with what are technically known as *grade marks;* to jumble them, indeed, to the extent of assuming that the two terms are synonymous and the two species of marks interchangeable. Many members of the trade are evidently not aware that a wide gulf separates the two classes of identification. Indeed, when it comes to Federal registration, Uncle Sam manifests serious objection to *grade marks*. In the hope of enabling readers of *Oil & Fat Industries* to avoid some of the unfortunate consequences of grade mark substitution, this article deals in temporary gloom to serve later a constructive purpose.

Some of the unfortunate and costly mix-ups which have occurred with respect to grade marks have been due to the free-and-easy attitude that has been taken with respect to trade mark qualifications. In some quarters, the idea has been encouraged that a manufacturer, say of mayonnaise, or a refiner of peanut oil, is free to adopt as his trade mark any word, name, symbol or device that strikes his fancy so long as the mark is not already in use in the oil and fat industries, nor does not resemble the badge on a rival's goods so closely as to be likely to cause confusion in trade. This picture of freedom of choice is overdrawn. In his role of censor of trade marks, Uncle Sam not only refuses to issue certificates of registration to trade marks that are shadows or "doubles" of older marks, but he lays down certain broad prohibitions. If a marketer of oils or fats desires the broadest possible protection for his trade marks — that is to say if he seeks the shelter of the nation's basic trade mark law (the Act of 1905) he must avoid two patterns of brands. Geographical names he must forego; likewise, descriptive words. In this last category come what are commonly known as grade marks.

Descriptive Marks Barred

A GRADE MARK, a quality mark, or a character mark, may not be descriptive on the face of it. That is to say, it may not convey a descriptive message to the layman who is not familiar with the pet vocabulary of the trade in which it is used. The mark that comes under suspicion as an index of grade may be a noun instead of an adjective. It may be a simple arrangement of alphabetical letters or an innocent-appearing combination of numerals. But if it appears, upon investigation, that any mark which somebody seeks to monopolize as a trade mark has been serving all the trade in common, or part of the trade, as a key to flavor, or fineness, say a clue to first pressing, the chances of obtaining recognition for it is as an exclusive trade mark are exceedingly slim.

That the bars are up so high against anything that partakes of the nature of a grade mark is due in part to the fact that the descriptiveness which is taboo under our trade mark laws is not alone that bald, downright descriptiveness which conveys information regarding the physical properties of an article of commerce. Uncle Sam likewise rules out, as offensively descriptive, any word, combination of words, or phrase that describes the qualities of an article. On occasion, the censors at the U.S. Patent Office have turned away from the trade mark gate notations that did no worse than describe the results produced or the effects to be expected from use of a commodity. The net result of such sensitiveness to any descriptive function is, naturally, to exclude any des-

ignation that can be convicted of serving a grading purpose.

Before we look further into what is to be done about it, perhaps a word of explanation should be said as to why it is that so many labelers of fats and oils seem to be tempted to play up terms that are challenged as grade marks when offered for registration. One reason, probably, is that grade marks are familiar. They are constantly before the eyes of the captains of the industry and when the time comes to make formal choice of a trade mark the grade sign, or a thin disguise of the grade mark, instinctively comes to mind. Then, too, grade marks are usually eloquent. The born brander is always searching for a "handle" that is praiseful of his product.

One other incentive, perhaps the most important, is that many a marketer of compounds and edible specialties takes a trade mark cue from his customers. We will suppose that a firm is distributing under a corporate name—or perhaps under a family name or line name—several versions of a popular product. Each is identified, for purposes of quality and price distinction, by an individualistic name. Essentially these varietal names are grade marks. But the producer may find, as time goes on, that his public is using the item names for purposes of specification in ordering. Literally, the buyers have taken matters into their own hands and are using the grade marks as trade marks. When this comes to pass, the marketer usually tries to pedigree the promoted marks as full-fledged trade marks. Occasionally, too, the umpires at the U. S. Patent Office will make an exception in favor of a candidate that can be proven to have served the bona-fide purposes of a trade mark as well as a grade mark. Generally speaking, though, the chances are against the grade mark in this era of ever-increasing vigilance.

How does Uncle Sam determine to his own satisfaction whether a would-be trade mark is, at heart, a working grade mark? Here is a question the answer to which may afford many a member of the industry a clearer insight into his chances for trade name protection. In a nutshell, the U. S. Patent Office, when scrutinizing a mark or name, accepts the trade's own appraisals. Examiners in the Trade Mark Division are fortified for their work by batteries of trade directories, catalogues, trade journals, etc. When the status of a word or name is in doubt the reference publications are searched to ascertain the usage of the term in the trade. If the evidence is not conclusive, representatives of the Department of Commerce go into the marts of the trade involved and cross-examine the rank and file of trade factors as to the interpretation commonly placed upon the name that is on trial.

What is to be done about it? Not much, I fear, if a trader is ambitious to sew up, as his very own, one of his trade's accepted indicators of grade or composition. Even if the claimant is the only one who has aspired to fence off a grade-pointer as a trade mark, the officials at Washington will shake their heads, because they hold that if other members of the trade have not actually employed the specific word involved, they must be guaranteed a freedom in the use of such word any time that they may need it to describe their wares. There is salvation, though, for the brander who is deft enough to put the cart before the horse.

Ideal Trade Mark Requirements

TO WIN Federal recognition for a would be trade mark that started in life as a grade mark is a task to daunt the stoutest soul. But, if only the producer or refiner has foresight, the same purpose may be served by the reverse process of making a grade mark out of a trade mark. Under this last formula, the mark starts, say, as an arbitrary or fanciful word. It may even be suggestive of the product so long as its boastfulness or imagery stops short of downright description. The point is, though, that it is unique or original or individualistic. No manufacturer of an oil or fat product is using anything else like it. In short, the chosen name conforms, we will say, to what is the prime qualification of the ideal trade mark, viz, that it shall mean nothing to the public in the beginning.

However meaningless a trade mark may and should be at the outset, its destiny is to take on a definite, selfish meaning when it begins to circulate in the channels of trade. The meaning that the average trade-mark owner cultivates in his pet is association with a product, a place or a service. The purpose, usually, is to render the mark recognizable as identifying the origin or ownership of goods. There is no reason, however, why instead of, or along with these other objectives there should not be set as a goal the popular acceptance of a mark as a criterion of grade or quality. Indeed, this is no idle theory. Many of the most prominent firms in various lines of trade are employing varietal marks as symbols of commodity standards along with their service as source-marks.

Logically this whole idea of making merchandise marks do double duty as grade marks

(*Turn to Page* 43)

Notes of the Industry

Newfoundland Codliver Oil

According to Vice Consul Thomas D. Bergin, St. John's, Newfoundland, exports of common cod oil through the ports of St. John continue to fall off as more of the oil from fresh cod livers is diverted to the refined codliver oil.

In 1928 export of common cod oil used for tanning decreased from 764,396 gallons to 650,614 gallons, while exports of refined codliver oil increased from 293,081 gallons to 357,694 gallons.

There was a large decrease in the quantity of seal oil exported to the United States in 1928, the figures for 1928 being 189,000 gallons, as compared with 616,141 gallons in 1927, for the reason that the oil commands a much higher price in the European markets.

N. Y. Oil Traders Meet

The annual business meeting and election for officers and directors of the Oil Trades Association of New York will be held at the Waldorf-Astoria Hotel March 12. The following candidates have been nominated: — For president, Philip C. Meon, of the Borne-Scrymser Company; vice-president, A. A. Hoffman, of the American Oil & Supply Company; secretary, Joseph C. Smith, of the Smith-Weihman Company; treasurer, George Suraud, of the Chelsea Oil & Supply Company; directors, Philip C. Meon, A. A. Hoffman, Joseph C. Smith, George Suraud, Albert J. Squier, Thomas J. Skidmore, R. E. E. Hood, William L. Koburger, Clifford T. Weihman, William S. Williams, Edwin Stern.

Glidden Capital Increase

Stockholders of the Glidden Co. have been offered the right to subscribe for new common stock at $35 in the ratio of one share for five now held, providing the proposal for increasing the number of shares from 560,000 to 600,000 is approved.

The Franklin Brokerage Co., recently organized in Columbus for the wholesale distribution of linseed oil, turpentine, alcohol and other raw materials, expects to begin active business this week, according to William B. Bohn, vice-president and general manager.

Harshaw Chemical Company

H. A. Harshaw, newly elected president, announces a change in name and capital structure of the Harshaw Fuller & Goodwin Co., old chemical manufacturers, with main offices at Cleveland, Ohio.

The company, organized in 1892 as the Cleveland Commercial Co., was reorganized in 1898 as the Harshaw Fuller & Goodwin Co., with home offices in Elyria. To better identify the nature of the company's business President Harshaw announces a change in name to the Harshaw Chemical Co.

J. A. McGean, who for the past few years has been president of the company, is retiring and his son, Ralph L. McGean, vice president, is also retiring. No other changes are taking place. Fuller has not been connected with the company for several years and Goodwin while a stockholder is not active.

The company is changing its common stock from $100 par to no par and has authorized an increase in the number of shares in addition to those that will be exchanged for old stock.

Wesson Stock Dividend

Wesson Oil and Snowdrift Company at a special meeting in New Orleans voted for a stock dividend of 100 percent on the common stock. This dividend will be payable prior to April 1 to holders of record on February 28. This increases the common shares outstanding to 600,000. The present common dividend rate is $4 a share and it is expected that the company will maintain this rate by paying $2 a share on the increased common. The company will redeem June 1 its entire 142,114 shares of $7 cumulative preferred outstanding at $110 from funds derived from sale by the National City Company of the new issue of no par convertible preferred stock.

Fire of undetermined origin occurred late on the night of February 8 at the Newark, N. J., plant of A. Gross & Co., makers of red oil and stearic acid. The flames were confined to the oil finishing unit, which was destroyed. The loss, estimated at $40,000 to $60,000, was fully covered by insurance. The main buildings of the plant escaped damage.

An Unusual Catalog

Dow Chemical Co., Midland, Mich., chemical manufacturers, have issued an unusually attractive catalog, describing their products fully and illustrated with a considerable number of plant views, many of which are in color. The catalog runs well over a hundred pages and is bound in a grey art leather embossed cover. Information about each chemical product includes a general description of the appearance, molecular weight, melting points, solubility, uses, shipping classification, and packing.

Continental Buys Manufacturer's

Continental Can Co. recently announced the purchase of Manufacturer's Can Co., Harrison, N. J. This company manufactures a miscellaneous line of cans for packing paints, varnish, oil grease, etc. The business will be transferred to one of the Continental plants. Since Jan. 1, 1928, nine can making companies and one manufacturer of can making machinery have been absorbed by the fast growing Continental organization.

Davidson Commission Co., oil and fat brokers, Chicago, recently issued a twelve-page booklet giving statistics on the prices of tallow, grease, soap stock and several vegetable oils between 1918 and 1928.

Pressed Steel Tank Co., Milwaukee, has announced the appointment of Tweedy Co., Inc., 24 California St., San Francisco, as sales representatives for the entire line of Hackney barrels and drums in the state of California.

Niagara Alkali Co., 9 East 41st St., New York, recently issued a book giving complete information concerning the properties, packaging, handling and use of caustic soda and caustic potash. Copies may be obtained free of charge from the New York Office.

Larkin Co., Buffalo, has announced the appointment of three executives, effective Feb. 5. They are J. C. Larkin, in charge of retail selling, James E. Wilson in charge of transportation, and Theodore C. Jewett in charge of engineering. The company reported record sales in all of its departments, including its paint, varnish and enamel division, during 1928.

New Driers on the Market

The I. G. Farbenindustrie has recently invented new driers called "Soligen driers," which it claims have far greater drying power than resinic and linoleic acid driers. The advantage of the new driers is that an organic acid is employed which combines chemically with larger amounts of metal than the generally used resinic and linoleic acids. The soligens contain no free acid, are entirely free from resins, always have the same metallic content, therefore, exhibit uniform drying action. The driers are furnished in both solid and liquid form, and are reported as being extensively used by the manufacturers of varnishes, lacquer, oilcloth, artificial leather, printing ink, and electrical insulating compounds.

Cod Oil Imports Decrease

Cod and Cod Liver Oil imports decreased slightly during the first ten months of 1928, as compared with the same period in 1927. The total figures of both oils for the two periods were as follows: Imports 1928, 3,113,000 gallons, valued at $2,533,000; imports 1927, 3,529,000 gallons, valued at $2,584,000. Of the 3,113,000 gallons imported during the first ten months of 1928, 1,987,000 gallons consisted of cod liver oil and the remaining 1,126,000 gallons of cod oil.

Coen Companies, Incorporated, Los Angeles, Calif. have taken over the olive oil plant of Charles P. Grogan Co. of that city. The latter company has been in the olive oil business for thirty years past. The plant is being doubled in size by the new owners and a new modern refinery equipped with the latest machinery is being built. Charles P. Grogan Co. will continue to distribute their Purity Brand olive oil as in the past.

Crude cottonseed oil, on hand Dec. 31, 1928, totaled 133,836,969 lbs., as compared with 158,834,182 lbs. on the same day in 1927. Stocks of refined cottonseed oil amounted to 431,693,697 on Dec. 31, 1928, as compared with the 503,139,695 lbs. on hand Dec. 31, 1927.

Wesson Oil and Snowdrift Co. recently put out an issue of 400,000 shares of convertible preferred stock which was oversubscribed. National City Co. arranged for the issue.

RECENT PATENTS

THE interesting process for the production of glycerol from sugar is described as follows in Canadian Pat. No. 285,399: Glycerol is produced from sugar by fermentation in an alkaline solution, by distilling off volatile fermentation products of the fermented mash and refermenting the residual mash by the addition of further quantities of sugar, small quantities of sodium sulfite and yeast. For example, 2 kilograms of molasses is dissolved with 10 grams of sodium phosphate and 750 grams of crystallized sodium sulfite in 8.5 liters of water, and a solution of 10 grams of magnesium sulfate, 10 grams of nickel sulfate and 100 grams of yeast in 2.5 liters of water is added. This mash is allowed to ferment at 30-35°C. After about two days the sugar will have fermented. The yeast is then filtered off, the alcohol and aldehyde are boiled away and 2 kilograms of molasses and 100 grams of sulfite, 5 grams magnesium sulfate, the filtered off yeast and 50 grams of fresh yeast are added, the whole being made up to 11 liters. After two days at 30-35°C. the sugar will have disappeared. This operation is repeated, 1 liter of water being added each time. If, for instance 8 kilograms of molasses has been fermented in this manner and the glycerol has been isolated, about 2 kilograms of raw glycerol will be obtained, equivalent to 960 grams of pure glycerol.

Materials containing unsaturated compounds, such as mineral or *fatty oils,* resins, asphalts, tar distillation residues, rubber and rubberlike products or styrene are treated to modify their properties by use of a solution or colloidal solution of electrolytes in an organic solvent. A sulfurizing treatment with sulfur or sulfur chloride may be effected at the same time or subsequently to the electrolyte treatment and accelerators may be added. China wood oil and ether are treated with a mixture of stannic tetraphenyl and alcohol, the solvent is distilled off and the product is emulsified with water with the addition of the reaction product of a fatty oil and sodium cresylate. The emulsion thus prepared is suitable for use with rubber latex for various purposes. Br. Pat. No. 289,415.

A body of fatty oil, such as linseed oil, is agitated with an aqueous caustic alkali solution in about the quantity corresponding to the free fatty acids present, the mixture is allowed to stand quiescent for a time less than required to effect settling but sufficient to permit agglomeration of the solid soaps formed by the agitating action; the temperature is then raised to a point slightly below 100°C. and hot water is passed through the mixture in finely divided form until the oil is rendered neutral and the aqueous solution of soap is separated. U. S. Pat. No. 1,692,226.

Fatty acids, such as stearic or palmitic acid, are mixed with hydrocarbons such as benzol or toluene or xylene and the mixture is treated with fuming sulfuric acid The resulting sulfo-fatty-aromatic acids may be used for *hydrolyzing fats,* producing emulsions, solid soaps, or soap powders and for washing fabrics in the textile industries. Br. Pat. No. 289,934.

In purifying fats and oils by the use of alcohol or other suitable solvent which is miscible with water and which dissolves fatty acids, resins and bitter and mucilaginous substances, but does not readily dissolve neutral fats, with the addition of water and ammonia as described in Br. Pat. No. 226,767, there may be added also a fat solvent such as benzol, ethylene dichloride, or trichlorethylene; and sodium sulfate. Br. Pat. No. 289,801.

Substantially neutral vegetable oils such as cottonseed oil may be decolorized and clarified by treatment with sufficient alkali solution to render the oil slightly alkaline and then, before removal of the alkali and its reaction products, treatment of the oil with an adsorbent earth. U. S. Pat. No. 1,696.

White oil paints made from lithopone may be prevented from thickening by adjusting the free fatty acid content of the linseed oil used to the zinc oxide content of the lithopone (suitably by the addition of free fatty acids derived from linseed oil, wood oil or wool fat, and preferably as colloid material). Br. Pat. No. 289,153.

ABSTRACTS

David Wesson, *Abstract Editor*

Wijs Iodine Determination

The decision of the International Union of Pure and Applied Chemistry, to recommend the adoption of the Wijs process for the determination of iodine values, especially in forensic cases, has led M. Wijs to contribute a short paper on the subject to the Society of Public Analysts, which was read at their last meeting. He points out that in certain text-books the quantities of iodine chloride and iodine used in the preparation of 1 litre of solution are erroneously given as 9.4 and 7.2 grms. respectively, whereas they should be 9 grms. and 10 grms., the solution being afterwards diluted with acetic acid to N/5 strength. When the solution is likely to be exposed to low temperatures, such that it crystallizes, it may be prepared from a mixture of 300 c.c. carbon tetrachloride and 700 c.c. acetic acid in place of 1 litre of acetic acid. It has long been recognized that a considerable excess of the reagent over that required by the oil taken is necessary for satisfactory results, but the author recommends that not more than 30 per cent. of the reagent shall be absorbed—that is to say, there shall be an excess of more than double the amount taken up by the oil. *Perf. & Essen. Oil Record,* 1929, 36.

Bömer and Ebach, experimenting on palm kernel oil, have been unable to obtain any indication of the presence of simple triglycerides, either by distillation of the oil in vacuo of the cathode light, or by distillation after fractional crystallization. They have, on the other hand, succeeded in isolating pure triglycerides from other and less important fats. Thus in laurel oil they have found thirty percent trilaurin, and in nutmeg oil forty percent of trimyristin. *Zeits. unters. Lebens.* 1928, 501.

China wood oil when heated below 200° C. for about twelve hours, and subsequently at 250-300° C. with the addition of various agents, such as oxidizers, reducers, terpenes, halogen compounds, acetates, phthalic compounds and aldehydes, does not gel in the usual manner and dries clear. *Farbe u. Lack* 1928, 558.

A proposed new method of making the cold test determination on neatsfoot oil and various other oils consists of cooling the oil by drawing dry air through ether in a special three walled Dewar flask in which a tube of the oil is supported. The entire apparatus is transparent and readings, except the final one, are made without removing the oil tube from the cooling bath. The temperature of the ether cooling bath is more easily regulated than that of ordinary cooling mixtures. It is claimed that results obtained by this method agree within one degree F. with those obtained by the Tentative Method of the A. S. T. M. *J. Am. Lea. Chem. Assoc.* 23, 595 ,(1928).

The Moscow State Institute for Experiment on Silicates has tested a number of variously treated oil-bleaching clays for adsorption power and reports: (1) The presence of magnesia has no relation to the adsorptive power of the clay, as claimed by some. (2) Crystalline clays have lower bleaching qualities than colloidal clays. (3) Clays suspended in water show a higher power of bleaching than the original clay. *Trans. State Expt. Inst. Silicates* (Moscow), 1927 No. 21, 67-72.

The cardinal question whether a chemical reaction, oxidation or a colloidal phenomenon of jellying is the primary cause of the drying of oils, and whether the drying requires preliminary oxidation is still unanswered. H. Wolff and G. Zeidler spread boiled oil plus drier, raw linseed oil, and wood oil with acid but without drier, on iron and zinc plates, and noted the subsequent increase or decrease in weight. The results leave the question of chemical or colloid reaction during drying still an open one. *Chem. Umschau Fette, Oele, Wachse u. Harze* 35, 313-7 (1928).

Safflower (carthamus tinctorious) is an annual belonging to the order compositae, which grows wild in the Caucasus and in Southeastern Russia. The oil contains the glycerides of stearic, palmitic, linoleic, and linonenic acids, which also occur in sunflower oil, with which it is interchangeable. When heated to a high temperature safflower oil undergoes polymerization. *Masloboino Zhirovoe Delo* 1928, No. 6.

Market Report on

FATS, OILS AND GREASES

(*As of Mar.* 4, 1929)

NEW YORK—Prices of oils, fats and greases continued to rise steadily through the recent period. No remarkable gains in price were recorded, but a large percent of the items were priced slightly higher at the close of the period. Corn oil and menhaden oil made the most conspicuous advances, continuing their recent rises resulting from short stocks. Refined cotton oil was up fractionally, as was linseed oil. Tallow, lard, and grease were higher on some grades. Red oil was very firm, as was stearic acid. Coconut oil declined on spot, while Coast material rose slightly in price. Olive oil and foots registered the only important price drops, as stocks appeared in better volume.

Coconut Oil

Quiet conditions in the coconut oil market brought about a slight drop in the price of spot oil. Lighter offerings of coast tanks caused fractional advances on all grades. Ceylon bbls. were priced at 9½c to 9⅝c, with Manila at 9⅝c to 9¾c lb. Coast tanks were at 7⅞c to 8c lb. for Ceylon and Manila grades. Copra was unchanged at last month's closing figures, 4¾c to 4⅞c lb.

Corn Oil

Stocks of corn oil were still light, with the result that price advances occurred during the period. At the close the oil was still very firm. Tanks were quoted at 9⅝c to 9¾c lb., with bbls. at 11c. Refined was priced at 12c with fatty acid at 11c.

Cottonseed Oil

Trading in cottonseed oil was quiet during the recent period, with buyers content to stand off and watch the market. Strength in competing materials prevented any decline in the price of crude oil, and P. S. Y. rose fractionally. The closing quotations were: crude, 9c lb.; P. S. Y., 10¾c to 11¼c; fatty acid, 11¼c.

Grease and Lard

There was a fair amount of activity in grease and lard during the period. With light offerings and a normal inquiry, prices advanced fractionally on several items. White grease was priced at 8¾c to 10c lb., yellow at 8½c to 8⅝c, house at 8½c to 8⅝c, and brown at 8¼c to 8½c lb. Lard was quoted at 11¾ for city tierces, 12½c to 12¾c for compound tierces, 12¼c for midwestern, 13¼c for neutral and 12½c for prime western.

Olive Oil and Olive Oil Foots

Stocks of these oils were in better volume than was the case at the close of last period, with resultant shading of prices during the period. With demand continuing steady the market firmed up toward the close. Closing prices were $1.30 to $1.35 for oil, and 10½c to 11c for foots.

Linseed Oil

Linseed oil gained another 10c a hundred during the recent period, after making a similar gain in January. Strength in flaxseed, coupled with a steady call for linseed, caused the rise. The base price for crude oil in car lots was 10 1/5c lb. Boiled oil in tanks was priced at 9 4/5c lb., with refined in bbls. still at 10 9/10c lb. Cake closed again at $47 to $48 ton, with meal unchanged at $57 ton.

Red Oil and Stearic Acid

Increased cost of stocks caused producers of red oil to advance quotations ½c lb. on all grades. Demand continued good in the face of the advances. Closing quotations were 11c to 11½c for distilled or saponified in bbls., and 10¼c for tanks. Stearic acid quotations were unchanged, but strength in red oil caused a stronger position in stearic acid. It closed again at 18c to 18½c for double pressed, and 20c to 20½c lb. for triple pressed.

Menhaden Oil

The market on crude oil was strictly nominal, with stocks about exhausted. The refined oil continued its rise on the strength of the crude situation, and advanced 2c gal. on all grades. Closing prices were 71c to 73c gal. for light pressed in bbls., 73c to 75c for yellow bleached, and 76c to 78c for white bleached.

Tallow

Tallow continued its rise, and gained another ¼c lb. on all grades during the period. The rise was attributed to firmer conditions in the market for raw materials. Edible was priced at 10c to 10¼c lb., city extra at 9¼c to 9½c, with special at 9c to 9¼c lb.

Candles, ad
20-set cas
40-set ca
Candles, pa
40 sets -
6s 14 oz.,
36 sets
6s 12 oz.
6s 12 oz.
36 sets
Patent c
Stearin 6
Castor, No
No. 3, bl
Chinawood,
Coast, ta
Future
Coconut, C
Coast,
Cochin
Manila,
Tanks
Coast
Fatty ac
Cod, Newf
Copra, bag
Corn, tank
Bbls., N
Refined,
Fatty ac
Cottonseed
P. S. Y
Fatty ac
Degras, d
Englis
Germa
Neutral,
Englis
Germa
Greases, c
Yellow
Brown
House
Bone N
Herring,
Horse, bb
Lard, city
Comp
Middle
Neutral
Prime
Lard oil,
No.
Extra,
No.
Winter
Prime,
Linseed
Car
Less
Less
Doubl

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¾	.14
No. 3, bbls.	lb.	.13¼	.13½
Chinawood, bbls. or drs.	lb.	.14½	.14¾
Coast, tanks, spot	lb.	.12¾	.13
Futures	lb.	.12¾	.13
Coconut, Ceylon grade, bbls.	lb.	.09½	.09⅝
Coast, tanks	lb.	.07⅞	.08
Cochin grade, bbls.	lb.	.09¾	—
Manila, bbls.	lb.	.09⅝	.09¾
Tanks	lb.	.08¼	.08⅜
Coast tanks	lb.	.07⅞	.08
Fatty acids, mill, tanks	lb.	.12	—
Cod, Newfoundland, bbls.	gal.	.65	.67
Copra, bags, Coast	lb.	.04¾	.04⅞
Corn, tank, mills	lb.	.09⅝	.09¾
Bbls., New York	lb.	.11	—
Refined, bbls.	lb.	.12	
Fatty acid	lb.	.11	
Cottonseed, crude, tanks, mill	lb.	.09	—
P. S. Y.	lb.	.10¾	.11¼
Fatty acids, mill, bbls.	lb.	.11¼	
Degras, domestic, bbls.	lb.	.04½	.06
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.04	.04½
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08¼	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbls. N. Y.	lb.	.08¾	.10
Yellow	lb.	.08½	.08⅝
Brown	lb.	.08¼	.08½
House	lb.	.08½	.08⅝
Bone Naphtha	lb.	—	.08⅛
Herring, coast tanks	gal.	.40	—
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	—	.11¾
Compound, tierces	lb.	.12½	.12¾
Middle Western, tierces	lb.	—	.12¼
Neutral, tierces	lb.	.13¼	—
Prime Western, tierces	lb.	.12½	—
Lard oil, No. 1, bbls.	lb.	.13	—
No. 2, bbls	lb.	.12¾	—
Extra, bbls.	lb.	.13½	—
No. 1, bbls.	lb.	.13¼	—
Winter strained, bbls.	lb.	.13¾	—
Prime, bbls.	lb.	.15¾	—
Linseed Oil, boiled, tanks	lb.	.0980	—
Car lots, bbls.	lb.	.1060	—
Less car lots, bbls.	lb.	.1100	—
Less than 5 bbls.	lb.	.1140	—
Double boiled, less than five bbls.	lb.	.1170	.1180
Raw, tanks	lb.	.0940	—
Car lots, bbls.	lb.	.1020	—
Less car lots, bbls.	lb.	.1060	—
Less than 5 bbls.	lb.	.1100	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1090	.1130
Varnish grades, bbls.	lb.	.1110	.1150
Linseed cake, bags	ton	47.00	48.00
Meal, bags	ton	57.00	—
Menhaden, crude, tanks, Baltimore	gal.	—	Nom.
Light pressed, bbls.	gal.	.71	.73
Yellow bleached, bbls.	gal.	.73	.75
White bleached, bbls.	gal.	.76	.78
Mustard, bbls.	gal.	.90	—
Neatsfoot, cold pressed, bbls.	lb.	.19	—
Extra, bbls.	lb.	.13½	—
No. 1, bbls.	lb.	.13¼	—
Pure, bbls.	lb.	.15¼	—
Oleo, No. 1, bbls.	lb.	.11½	—
No. 2, bbls.	lb.	.11	—
No. 3, bbls.	lb.	.10½	—
Olive, denatured, bbls., N. Y.	gal.	1.35	1.35
Shipments	gal.	1.25	1.27
Foots, bbls.	lb.	.10½	.11
Shipments	lb.	.10¼	.10½
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, casks spot	lb.	.09	.09¼
Shipments	lb.	.08¾	—
Niger, casks, spot	lb.	.08½	—
Shipments	lb.	.08	—
Palm Kernel, pkgs.	lb.	.09⅛	.09¼
Tank cars	lb.	.08⅛	.08⅛
Peanut, crude bbls.	lb.	.12	—
Mills, tanks	lb.	.10¼	—
Refined, bbls.	lb.	.13½	—
Perilla, bbls.	lb.	—	Nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.05	1.07
Refined, bbls.	lb.	.85	.86
Red Oil, distilled, bbls.	lb.	.11	.11½
Tanks	lb.	.10¼	—
Saponified, bbls.	lb.	.11	.11½
Tanks	lb.	.10¼	—
Salmon, coast, tanks	gal.	.44	—
Sardine, coast, tanks	gal.	.45	—
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.12¼	.12½
Orient, coast tanks	lb.	.10	—
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.86
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.18	.18½
Triple pressed, bags	lb.	.20	.20½
Stearine oleo, bbls.	lb.	.11¾	.12
Tallow, edible, bbls.	lb.	.10	.10¼
City extra, works, loose	lb.	.09¼	.09½
Special, works, loose	lb.	.09	.09¼
Tallow oil, acidless, bbls.	lb.	.12	—
Tanks, N. Y.	lb.	.11¾	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07¼	—
No. 2, coast, tanks	lb.	.06¾	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Research and Mayonnaise

(*From Page* 13)

they seek more freely such scientific contacts. The industries should seek more fully the co-operation of academic investigators and should point out to the chemical world the fundamental unsolved problems underlying their procedures."

Just at this point, may I inject a word of warning to those of you who are using some form of chemical control in your factory operations. In my long contact with the food industries, I have found that the principal use to which the chemist or scientist is dedicated is the control of the manufacturing operations, together with a surveillance over the raw materials used. Only too often have I seen and met such chemists who are staggering under an added load of attempting to solve a real research problem in connection with the technology of his product. This dual demand on a single individual cannot be successfully met by him. Either one or the other activity is bound to suffer, and of course, from the standpoint of existence, the control work cannot be slighted. Research work, whether in the university laboratory or in institutions or in a commercial organization for its most successful development must be unhampered by other activities. The research man must eat, drink, live and sleep his problem. He must give his undivided time and attention to it if success is to crown his efforts.

In conclusion let me express the hope that what I have said may lead you to regard research as something absolutely essential to the well-being and progress of your industry, that you must look forward through research to newer and better methods of manufacture, newer and other uses for your product, and that such goals are only attained through perseverance.

Selecting a Trade Mark

(*From Page* 32)

and trade marks has caught, particularly, the full line marketers. Not so much, perhaps, the sellers of diverse families of products as the multiple marketer who puts out several grades of the same product. Latter-day competitive conditions such as the temptation to put out one grade of goods for the cut-rate chain stores and another for the high-grade grocery stores, have added to the urge to differentiate and emphasize commodity distinctions while retaining all the prestige of the line name. For all that the appeal is stronger to those in group selling, trade mark experts declare that this strategy of plotting every trade mark as a potential grade mark is not to be scorned by the marketer of a lone specialty. The argument is that, however single-minded a marketer may be today, there is no telling what he may desire to do tomorrow or the day after tomorrow. If the time comes when he deems it wise to expand his line he may thank his lucky stars that he has entrenched himself with a double-purpose name that will simplify for the consuming public its selective purchases.

New Laboratory Hydraulic Press

A new type of small hydraulic press suitable for use in the laboratory of the oil and fat plant or for other experimental work, is now being manufactured by Fred S. Carver, 95 West Street, New York. The press is hand operated and stands about three feet high. It will give pressures up to 25,000 pounds through operating the hand lever for four or five seconds, and is equipped with suitable pressure gauge. For pressing oil meals, etc., for laboratory samples, the press is equipped with a special cage having separator plates and filter pads. The cage equipment can be lifted out and the press used for various other purposes in the plant laboratory. The equipment has been standardized by the Carver organization and presses are carried in stock for immediate shipment. Formerly, laboratory hydraulic presses were built to order at high cost, but the standardization of the new press makes it available at a sharply lower cost. The maker states that many of the largest producers of vegetable oils, stearic acid, candles, soaps, disinfectants, etc. have already purchased this new press. The firm will furnish literature upon request.

The annual convention of the Interstate Cotton Seed Crushers' Association will be held at the Hotel Roosevelt, New Orleans, La., May 15, 16 and 17

Wanted. Sales Manager to take charge of Hard Coconut Butter and Special Oil Department. Must know the trade using these products. Good opportunity for anyone who has had experience with these commodities. Address Box D-22. Care of Oil & Fat Industries.

OIL & FAT INDUSTRIES

The Editor's Page

Dairy Interests Shoot Again

THE publicity broadcast by the Dairy Interests' lobby in Washington has recently given great prominence to a masterpiece of proposed legislation which, although favorably reported by the House Committee on Agriculture, failed of action in the Seventieth Congress. This proposed act was known as H. R. 10958, and provided an amendment to the definition of oleomargarine in the law imposing a tax on butter substitutes.

Greatly chagrined at the failure of Congress to enact the proposal into law at its last session, its proponents have inaugurated a drive to enforce its passage at the coming extra session, and are flooding the newspapers of the nation with carefully biased "news," which is so prepared as to make it apparent that the manufacturers of cooking compounds composed of well-refined, clean wholesome vegetable oils are guilty of all the crimes possible under the Pure Food Laws. Judging from the wording of this propaganda, the Congressmen from dairying regions are treading on each other's feet in a wild rush to be first to re-introduce this measure. In one day's release the champion of the desired enactment is Representative Selvig, (Rep.), of Crookston, Minn., who is quoted at length in the usual style of the dairy interests and reduces all opponents to pulp with an avalanche of "merely" and "simply."

We give here a few excerpts from Mr. Selvig's tirade:— "This proposal *merely* extends the definition of oleomargarine. It *simply* brings in under the scope of the Oleomargarine Act passed 43 years ago products colored in the semblance of butter. It *merely* includes such new products which scientific knowledge has invented which have been introduced into the markets of the country since the original oleomargarine law was passed." ..."The deceptiveness of the product is obvious to all. This deceptiveness is such that even an expert can not determine from appearance, taste or odor the difference between butter, oleomargarine and the product under discussion". . ."The dairy industry of the United States must be safeguarded". . ."The welfare of our Nation depends upon safeguarding the dairy industry". . ."This bill will aid our farmers. No one who has given it thought and study can deny that fact". . . . .etc., etc.

On another day Representative Haugen, (Rep.), of Northwood, Iowa, Chairman of the House Committee on Agriculture, and Co-author of the famous McNary-Haugen equalization fee, is represented as the sponsor of the bill. Mr. Haugen is quoted somewhat along the same lines as Mr. Selvig, with the exception of some very interesting statements as to the composition of butter, for example. . . . . "These so-called cooking compounds are made by mixing these fats together in water or some other liquid, so they form an emulsion very nearly identical in its form to the emulsion of butter fat and water, which is butter." Mr. Haugen's statement is published elsewhere in this issue in full.

The Facts are as follows:— manufacturers of shortening have discovered that a product of superior quality and properties can be produced by mixing certain vegetable oils and a small percentage of water, and that the product so prepared can be satisfactorily distributed in one-pound cartons, similar to the one-pound carton of lard.

Their temerity in daring to sell their product in the shape of a print of butter has brought down upon their heads the wrath of the mighty dairy interests, whose evident intention and purpose is that no fat shall be sold in the United States except that produced from the lacteal fluid of the cow. No reasonable person would attempt to claim that a mixture of vegetable oils and water can by any stretch of the imagination be said to look, taste or smell like butter, and we assure the Honorable Messrs. Selvig and Haugen that any ten-year old farmer's boy or girl would be able to distinguish between these products and butter at the first taste, but. . . . ."The welfare of our Nation depends upon safeguarding the Dairy Industry." It is to laugh.

Oil Chemists' Twentieth Anniversary

THE Annual Convention of the American Oil Chemists' Society, to be held at The Hotel Roosevelt in New Orleans, May 13 and 14, marks the rounding out of the first twenty years of the Society's existence. In retrospect,

the members of the Society can look back with pride upon the progress and accomplishments of these twenty years. The knowledge of the technique of oil production and refining and soap manufacture, as well as the manufacture of the many developed products of oils and fats has advanced and developed to an astounding degree since that time, twenty years ago, when a little group of less than twenty chemists met to launch this association. The Society has grown with the industries of which it is a part. The membership today is over three hundred, including every chemist of prominence in fatty oil and soap work, as well as many of the younger generation who are contributing their part to the furtherance of technical knowledge and skill in the industry.

Our understanding of the composition of fats and their products is unfolding rapidly, and our ability to produce new products from them, by new methods, is growing almost as rapidly. In all of this The American Oil Chemists' Society has played a leading part, and will undoubtedly continue to do so in the future in even larger measure. We stand on the threshold of even greater progress in the knowledge and understanding of synthetic chemistry during the coming decade than the world has ever imagined in the past, and it is only reasonable to expect that this progress will be as great in the field of oils, fats and soaps as in any branch of chemical technology. For this reason, if for no other, every chemist who is engaged in work involving the technology or analysis of oils, fats, or soaps should be a member of The American Oil Chemists' Society, in order that he may avail himself of the opportunities the Society affords for the exchange and dissemination of useful knowledge in relation to his profession and its progress.

Synthetic Fats

THE greatest stimulus to increased production of any product is a continued high market price for that product. The surest way to encourage competition from new sources is to put the price of a product high enough so that it becomes attractive to the new competition. Likewise, new chemical developments are spurred forward when the market price of the product or products is high. Chemical research in the field of high priced products is always carried on with greater enthusiasm and the hope of larger eventual profits.

Sooner or later, synthetic oils and fats are going to be a commercial reality in the United States. Glycerides will be built up eventually on a commercial scale from mineral hydrocarbons, or from coal and hydrogen. The advances in synthetic chemistry throughout the world during the past five years have been the handwriting on the wall. Take the cases of synthetic acetic acid, wood alcohol or methanol, motor fuels, and last, ethylene glycol. The extremely high prices for glycerin some three years ago were unquestionably a stimulus to greater sale and expanded production of synthetic glycol. This product is now a keen competitor of glycerin. Were it permitted, synthetic methanol could wipe out the natural methanol industry to-morrow.

If a sharply higher tariff on oils and fats increases the domestic prices of these products correspondingly, and it probably will as this is the chief reason for its consideration, the development of synthetic glycerides in the United States will be given a marked stimulus. The margin between cost of production and selling price will be widened and lend just that much added attractiveness to industrial projects aiming to synthesize oils and fats. Synthetic processes which might not be a competitive proposition with a natural fatty oil at nine cents, might be able to operate effectively in getting under way with the same oil at thirteen cents.

There are numerous instances where prices of manufactured commodities have been held at low levels purposely so as to discourage new people entering the field. There are an equal number of cases where high prices have brought wider and keener competition. This is an aspect of the present oil and fat situation which American producers must take into consideration. They must not forget that if they disturb the present world-wide balance in oil and fat production and consumption, it may react to their detriment in the long run. Unquestionably, the greatest potential competitors of the producer of oils and fats to-day are the products of synthetic chemistry. If producers are enabled to put the price of fats up unduly, then consumers will employ every means in their power to avoid using them. Substitutes will be sought out. Experience proves this to be the inevitable consequence of market disturbances.

Once again, we urge that every angle of the proposed 45 per cent tariff on oils and fats be studied deliberately and carefully before anything is done. Is it really what the American producer of oils wants? Is it going to be a boomerang in the end? Do not forget that synthetic fats are far more than a remote possibility. They are worthy of serious consideration.

American Safflower Seed Oil

By George S. Jamieson *and* Samuel I. Gertler

Contribution From the Oil, Fat and Wax Laboratory Bureau of Chemistry and Soils. United States Department of Agriculture.

SAFFLOWER seed oil is obtained from the seed of *Carthamus tinctorius* L., a plant which has been extensively cultivated for many years in India, Egypt, and Turkestan as an oilseed crop. The seed, which somewhat resembles small sunflower seed, contains from 20 to 30 per cent of oil, and the kernels contain from 46 to 50 per cent. The oil is produced in considerable quantities in India, where it is used as a drying oil in the paint and varnish industries. It possesses value also as an edible oil and for use in the manufacture of soap.

With a view to introducing this crop in the United States as a source of oil to supplement the domestic production of drying oils, the Bureau of Plant Industry, U. S. Department of Agriculture, has for several years made experimental plantings of safflower in various localities of the Northwest and in the middle western States under the direction of Mr. Frank Rabak.*

Much information with regard to the agronomic requirements of the crop has been obtained, and also technological information regarding the production and handling of the oil. Crushing tests on a semi-commercial scale have been made with American-grown seed for the production of the oil and press cake. This oil has been tested in the laboratory and by manufacturers of paints and varnishes and has been found to possess value as a drying oil in these industries. The press cake has been found useful as a stock feed. Hot-pressed oil from seed grown in Montana has been investigated in this laboratory and its approximate composition determined.

The chemical and physical characteristics are given in Table 1. The iodine number of this oil, from 138 to 145, is somewhat higher than that usually reported for the foreign oil. The percentages of saturated and unsaturated acids were determined by the lead-salt-ether method, and corrections were made for the small quantity of unsaturated acids that are precipitated and weighed with the saturated acid fraction (Jour. Amer. Chem. Soc. 1920, 42, 2398; Cotton Oil Press, 1922, 6, 41). The percentage of unsaturated acids has also been corrected for the unsaponifiable matter that remains with the unsaturated fraction.

TABLE I

SAFFLOWER OIL

Specific gravity 25/25°	.9243
Refractive index at 25°	1.4744
Acid value	5.56
Iodine number (Hanus)	149.3
Iodine number (Wijs)	149.1
Saponification value	190.5
Acetyl value	12.5
Reichert-Meissl value	0.2
Polenske number	0.1
Hexabromide . . . . %	0.4
Unsaponifiable matter . . . . %	.59
Saturated acids (corrected) %	5.93
Unsaturated acids (corrected) %	87.72
Iodine No. of Unsat. Acids	156.0

Unsaturated Acids

THE linolenic acid was separated and weighed as hexabromide according to the Washburn and Steele procedure (Ind. Eng. Chem. 1920, 12, 521). The average of 3 determinations in close agreement was 0.40 per cent of hexabromide, which is equivalent to 0.14 per cent of linolenic acid in the original oil. Having determined the percentage of linolenic acid, it is possible to calculate the percentages of oleic and linolic acid from the iodine number of the unsaturated fraction, 156.0, and the theoretical iodine numbers of the three acids; 274.1 for linolenic acid, 181.4 for linolic acid, and 90.1 for oleic acid. In this way the percentage composition of the unsaturated acids tabulated below was calculated.

	Unsat. Acid Fraction Per Cent	Unsat. Acids in oil Per Cent	Glycerides of Unsat. Acids Per Cent
Lino'enic Acid	.16	0.14	.15
Linolic Acid	71.82	63.00	65.8
Oleic Acid	28.02	24.58	25.7
	100.00	87.72	91.65

Saturated Acids

THE saturated acids which were separated from the mixed fatty acids of the oil, by the lead-salt-ether method, were esterified with absolute methyl alcohol, using dry hydrogen chloride gas (Jour. Amer. Chem. Soc. 1920, 42, 1200), and the resulting esters were fractionally distilled under diminished pressure. The data for the distillation are given in Table 2. The preliminary distillation was made from a 500 cc. Claisson flask, giving 5 fractions and a residue of undistilled esters which were redistilled in the order indicated in the table,

*Safflower, an oilseed crop, is adapted to Northern Great Plains. Separate from Yearbook of Agriculture, 1927. No. 1013.

from a 150 cc. Ladenburg fractionation flask. Seven fractions and a small residue were obtained.

TABLE II

FRACTIONAL DISTILLATION OF METHYL ESTERS OF SATURATED ACIDS

(123.6 g. taken for distillation)

(Preliminary distillation under 4 mm. pressure)

Fraction	Temperature °C	Wt. Gms.
A	176-9	21.50
B	180-3	22.05
C	184	21.55
D	185-8	22.20
E	190-200	21.90
Residue		14.80

(Final distillation under 2 mm. pressure)

Fractions A + B added...	1	163-8	9.20
	2	170-3	21.70
Fraction C added.....	3	174-6	23.10
Fraction D added.....	4	176-8	22.70
Fraction E added.....	5	180-3	22.59
Residue added	6	185-195	14.30
	7	200-220	9.45
	Residue		.75

The iodine numbers and the saponification values of these seven fractions were determined and are recorded in Table 3. The small final residue was saponified with alcoholic potash, and the fatty acids were liberated with hydrochloric acid, collected, dried, and crystallized from 12 cc. of absolute alcohol. The crystalline fatty acid (0.620 g.), which melted at about 77°, was recrystallized; then it gave a melting point of 80-80.5°. Equal quantities of this acid and lignoceric acid of known purity were intimately mixed, and the melting point of the mixture was 80 to 80.5°. Examination of alcoholic mother liquors failed to give evidence of any other saturated acids. The iodine numbers of the various fractions are the measure of the contaminating unsaturated acids, and from these values the percentages of the esters of these unsaturated acids were calculated.

TABLE III

SAFFLOWER OIL

RESULTS OF ANALYSES OF FRACTIONS OBTAINED BY DISTILLING THE METHYL ESTERS

Fraction	Iod. No.	Sap. Val.	Esters of Unsat. Acids %	Molec. Wt. of Esters of Sat. Acid	Myristic Acid %	Myristic Acid Gram	Palmitic Acid %	Palmitic Acid Gram	Stearic Acid %	Stearic Acid Gram	Arachidic Acid %	Arachidic Acid Gram	Lignoceric Acid %	Lignoceric Acid Gram
1	2.5	209.3	1.68	267.6	8.92	.8213	84.25	7.7510						
2	2.7	205.9	1.79	272.1			87.11	18.9013	6.05	1.3127				
3	2.6	204.9	1.72	273.5			82.57	19.0748	10.67	2.4088				
4	2.9	203.2	1.96	275.7			78.40	17.7975	14.62	3.3204				
5	3.5	198.8	2.28	282.0			54.07	12.2151	38.76	8.7571				
6	5.3	188.4	3.42	298.0			0.13	.1860	91.68	13.1100				
7	11.2	171.4	7.53	330.3							82.72	7.8170	6.15	.5812
Residue														.6200
Totals						.8213		75.9257		28.9090		7.8170		1.2012

From these percentages and the saponification values the mean molecular weight of the saturated acid esters in the several fractions were calculated. The mean molecular weights indicate what saturated acids may be present in each fraction. For example, the mean molecular weight of the saturated acid esters in fraction 1 (column 5, Table 3) is between methyl myristate (242.3) and methyl palmitate (270.3), and indicates that this fraction contained both esters, whereas the molecular weights of fractions 2, 3, 4, 5 and 6 suggest that they contain various proportions of methyl palmitate and stearate (298.4), but that fraction 7 is a mixture of methyl arachidate (326.4) and lignocerate (382.5).

In order to test the correctness of these deductions, the free fatty acids were recovered from several of the fractions by saponifying them with alcoholic potash, removing the alcohol, dissolving the soaps in water, and decomposing them with hydrochloric acid. The constituent saturated acids entirely freed from mineral acid were isolated by fractional crystallization from ethyl alcohol. Their identity was established by the melting points and by observing whether or not they were lowered when the substances were mixed with equal quantities of the respective acids which they were suspected of being, the purity of which had been established by analysis.

The deductions drawn from the molecular weights of the saturated acids were confirmed as follows:

Lignoceric acid $C_{24}H_{48}O_2$ melting at 80-80.5° was isolated from residue; arachidic acid $C_{20}H_{40}O_2$ melting at 77° was obtained from fraction 7; stearic acid $C_{18}H_{36}O_2$ melting at 68-69° was separated from fractions 5 and 6; palmitic acid $C_{16}H_{32}O_2$ melting at 63° was isolated from fractions 1 and 2. Ten crops of crystals were obtained from the fractional crystallization of the fatty acids from fraction 1 by gradually reducing the volume of the alcoholic solution and finally adding small quantities of water. The small tenth crop melted at 54-5°, and it was found to be myristic acid $C_{14}H_{28}O_2$.

The quantities of saturated acids in the fractions were calculated from the mean molecular weight of their esters and the theoretical molecular weights of the two esters in each fraction, the results of which are given in Table 3.

TABLE IV
SAFFLOWER OIL
SATURATED ACIDS

Acids	Acids in saturated acid fraction		Acids in original oil	Glycerides in original oil
	Grams	Per cent	Per cent	Per cent
Myristic	0.82	0.71	.04	.04
Palmitic	75.93	66.21	3.93	4.12
Stearic	28.91	25.21	1.49	1.56
Arachidic	7.82	6.82	.41	.42
Lignoceric	1.20	1.05	.06	.06
	114.68	100.00	5.93	

In Table 4 the percentage composition of the saturated acids is given in column 2. These values have been calculated to the basis of the original oil and are given in column 3. Column 4 gives the equivalent percentages of the glycerides.

Summary

THE chemical and physical characteristics of a sample of hot pressed oil from safflower seed grown in Montana have been determined. This oil was found to contain 87.72 per cent of unsaturated acids, and 5.92 per cent of saturated acids.

The composition of the oil has been determined with the following results, and, for comparison, results for sunflower seed and soy bean oils previously obtained, are also given.

Glycerides of:	Safflower Oil Per cent	Sunflower Oil[1] Per cent	Soy Bean Oil[2] Per cent
Oleic acid	25.7	33.4	33.4
Linolic acid	65.8	57.5	51.5
Linolenic acid	.15	0.0	2.3
Myristic acid	.04	0.0	0.0
Palmitic acid	4.1	3.5	6.8
Stearic acid	1.6	2.9	4.4
Arachidic acid	.4	.6	.7
Lignoceric acid	.06	.4	.1
Unsaponifiable Matter	.59	1.2	.6

[1] G. S. Jamieson and W. F. Baughman, J. Am. Chem Soc. 1922,44,2952. This oil gave an iodine number (Hanus) of 130.8.

[2] W. F. Baughman and G. S. Jamieson, ibid 2948. This oil gave an iodine number of 128.

It will be observed that safflower oil contains a considerably larger proportion of linolic acid and less oleic acid than either of the other two oils, and this fact would account for its superior drying power.

J. T. Baker Issues New Stock

An offering of 10,000 shares of the common stock of the J. T. Baker Chemical Company, Phillipsburg, N. J., at $12.50 a share was reported to be over-subscribed. The Baker company was organized in 1904 as a New Jersey corporation and has been chiefly engaged in the manufacture and sale of chemicals used for analytical purposes in industrial and educational laboratories. It also manufactures a large variety of chemicals for pharmaceutical and industrial uses. The company has recently purchased the business of the Dissosway Chemical Company, Brooklyn, and that of the Taylor Chemical Corporation, Cascade Mills, N. Y. Its factory property at Phillipsburg comprises 10 acres.

By action of the Board of Governors of the New York Stock Exchange the no par common stock of Spencer Kellogg & Sons, linseed crushers and vegetable oil refiners, has been listed for trading on the Exchange floor.

Vegetable Oils Duties

Vegetable oils imported into Syria must now be certified by a French consul.

The export surtax on olive oil originating in the second, fourth and fifth regions of Tunis has increased from 2 francs to 2.50 francs per 100 net kilos, by a recent decree.

A proposal has been made for replacing the existing surtax of 7 percent ad valorem on foreign olive oil and soya bean oil imported into French West Africa (except Ivory Coast and Dahomey) by the following specific rates, according to the Journal Officiel, Paris:—Olive oil, 105 francs per 100 net kilos; soya bean oil, pure or mixed in any proportion with any other edible oil, 157.50 francs per 100 net kilos.

The plant of the Southern Cotton Oil Company, at Ft. Gaines, Ga., is reported to be under water, in the flood that has been causing much trouble in that territory recently.

Domestic Soya Bean Oil

A Comprehensive Survey of the History and Prospects of Development in the U. S. A.

Presented before the Northwestern Paint Superintendents' Club.

By Otto Eisenschiml

ONE of the difficult tasks of a man living in this fast age is to keep track of the big developments going on around him. Busy as we all are with the little, pressing matters that have to be attended to, we are liable to overlook fundamental changes that are going on under our very eyes. One of the young giants in our commercial life that is beginning to stretch mighty and powerful limbs is the domestic soya bean industry. The birth of this newcomer is not an event that was heralded to a curious world in flaming newspaper headlines; nor is it an industry that will ever be as popular as the radio and moving pictures; but in its own inconspicuous way it is destined to play a role that will in time perhaps overshadow the other ones in importance. In fact, I cannot see why it should not eventually rival the cotton growing industry of the South. However, with the soya bean industry as such I am not concerned in this paper. Suffice it to say that soya beans were first brought to America in 1804 and that they were grown as a curiosity until 1880 when commercial crops began to appear here and there. In 1914 only 2,000 acres were planted in beans in the State of Illinois, but by 1927 this acreage had increased to 776,000. In the whole United States 50,000 acres were planted in 1917, 2,500,000 in 1924, and the acreage for 1928 was 2,847,000. Figuring an average yield of 18 bushels to the acre, it can readily be seen that the soya bean crop is fighting its way through to the smaller major crops of our country with rapid stride.

The average soya bean contains between 17 and 20 percent of oil, of which about 12½ percent is obtained by the usual crushing processes. This means, roughly speaking, a gallon of oil for every bushel of beans. The remaining cake makes a wonderful feed product which commands a substantial premium over competitive articles. Besides, it is finding its way as flour into dietetic articles and is also utilized for the manufacture of vegetable glue. Soya bean crops enrich the soil in nitrogen and each crop has, therefore, an intangible value besides a material one. The bean can be used as an excellent hog feed. In Europe the bean has lately been utilized as a human food in the form of flour, and it is claimed in particular that its value for undernourished children is incalculable. A few days ago I was visited by Professor Gebauer, of the University of Vienna, who told me about the latest achievements in that line. It is his opinion that part of these favorable results can be ascribed to the easy digestibility of the protein in soya beans. However, there are probably other factors at work which defy our present knowledge on the subject. I only hint at these matters to give background to my assertion that the rise of the soya bean industry has just started. The subject to which I wish to draw your attention tonight is that of soya bean oil; but I could not portray to you an idea of its coming importance without pointing to the healthy foundation of the crop that produces it.

During the war the general shortage of fats and oils made it necessary to import very substantial amounts of Manchurian soya bean oil. The import figures for 1918 show that 335,943,148 pounds were received from the Orient. This is equal to 5600 tank cars. In comparison with this, let us remember that the total amount of linseed oil consumed in the United States last year was equal to about 42,000,000 bushels of seed or 800,000,000 pounds of oil, equal to 13,334 tank cars. It was quite natural, therefore that the idea of producing soya bean oil from domestic beans should have received a decided stimulus under such conditions. North Carolina led the way producing a small amount of oil in 1916 and intermittently from then on. The first oil was produced in a cotton oil mill with the existing machinery and during a time when the mill otherwise would have been idle.

Chicago Heights Among the Pioneers

SO far I have been able to ascertain, the first soya bean oil made outside of North Carolina was made at Chicago Heights, Illinois,

in 1920, by the Chicago Heights Oil Manufacturing Company. An Anderson expeller was used, and I bought and sold the first twenty barrels made. In 1922 oil was made by the A. E. Staley Manufacturing Company, of Decatur, Illinois. At that time only one expeller was installed by this concern, but two more were installed shortly afterwards and 90,000 bushels of beans were crushed. The capacity of this mill today is over a million bushels per year. A. E. Staley, a North Carolinian by birth, is taking an active interest in 1923 the Blish Milling Company, of Seymour and Crothersville, Indiana, also began to crush soya beans, and their production rose to 317,000 pounds in the season 1927-1928.

In 1924 Funk Brothers, of Bloomington, Illinois, joined the ranks of these pioneers, engaging the services of I. C. Bradley, of the Chicago Heights Oil Manufacturing Company, and one of the greatest living authorities on soya beans and their allied lines. Mr. Bradley today has under his supervision mills that will crush in the season of 1928-1929 a probable total of 700,000 gallons. This compares to a total of 20,000 gallons made by him in Chicago Heights in 1921.

The total domestic production of oil was too small to be tabulated by the Bureau of Census in Washington until the year 1922, when the production is given at 751,000 pounds. Since that time it has risen in 1928 to 4,716,000 pounds as may be seen from the following table: 1921, 0 lbs.; 1922, 751,000 lbs.; 1923, 1,404,000 lbs.; 1924, 950,000 lbs.; 1925, 2,520,000 lbs.; 1926, 2,645,000 lbs.; 1927, 3,088,000 lbs.; 1928, 4,716,000 lbs.

The greatest handicap the soya bean oil industry had to combat has been the scarcity of mill beans. Only one or two mills have ever been able to run the year through. The farmers would either feed the beans to live stock or else they would hold them for seed purposes so that the mills could not work continuously and therefore economically. Last year Funk Brothers, in connection with the American Milling Company, at Peoria, offered the farmers a base price of $1.35 a bushel for a quantity up to a million bushels received for crushing purposes, and thereby seem to have stabilized their source of supply.

At the present time new mills for the crushing of beans are springing up everywhere and others are planned in various localities. Soya beans are now being grown in practically all states east of the Mississippi, and the erection of oil mills appears quite a logical sequence, especially in the South where existing facilities could be utilized to good advantage. In places where soya beans must be depended on exclusively for the operation of a mill, the question of a continuous supply of raw material will be a most important one. Curiously enough, the marketing of the oil and the cake presents far less difficulty.

The methods in use for the crushing of beans are the same as those in use for the crushing of flaxseed. Some producers are using expellers; others are using hydraulic presses.

Imports Decline as Production Increases

WHAT has happened to the importation of Manchurian soya bean oil during all this time of domestic developments? Import and export figures taken from theBureau of the Census and the United States Statistical Abstract will throw some light on this question:

	IMPORTS	EXPORTS
	In Pounds	
1918	335,984,000	———
1919	195,808,000	27,715,000
1920	112,214,000	43,512,000
1921	17,283,000	1,944,000
1922	17,294,000	2,458,000
1923	41,679,000	1,356,000
1924	9,125,000	2,264,000
1925	19,493	520,000
1926	30,712,000	1,567,000
1927	14,915,000	5,444,000
1928	13,116,000	7,142,000

It will be seen that the figures show a more or less steady decline, the 1928 imports being only about 4 percent of the imports of 1918. A 2½c per pound duty on foreign soya bean oil has been in effect since 1922 which makes it impossible for it to compete with domestic products of a similar nature except in localities where the freight rate offsets the duty, principally on the Pacific Coast. In the Chicago territory not a drop of Manchurian soya bean oil has been sold, so far as I know, in the last two years. Nevertheless some of the trade papers still carry solemn quotations on the imported article and ignore the domestic product completely. This in spite of the fact that the net imports of Manchurian oil in 1928 over exports was only slightly above the domestic production and most likely will be overtopped by it in 1929.

To get an idea of the possibilities of domestic oil production, it should be kept in mind

that in 1927 7,459,000 bushels of beans were gathered in the United States, which figure rose to 8,688,000 bushels in 1928. If all the beans were used for the production of oil, almost 9,000,000 gallons, or 70,000,000 pounds, of oil could have been produced, compared to net imports amounting to about 10 percent of this figure. Of course, this maximum amount is out of the question at the moment for more reasons than one, but who could possibly look at these rapidly rising numbers without a stir of his imagination?

The first domestic soya bean oil made in the United States was nothing to be proud of. It contained a great deal of moisture and foots and could not be marketed in its original condition. Since that time a great many improvements have been made and different brands can be had to suit almost any purpose. Soya bean oil can be used in unlimited quantities for soap making purposes; it can also be used as an edible oil, but is not particularly well adapted for that purpose. The uses which you, gentlemen, are interested in are those for the paint and varnish industry, and in this field soya bean oil has its well-defined place.

The raw or crude soya bean oil of domestic origin does not differ chemically from the Manchurian oil, but can easily be distinguished from it by its odor. The drying qualities of the two oils are the same, and they can be used in admixture with linseed oil in the same proportion. In this connection, it is well to refute the extravagant claims made by some soya bean oil enthusiasts. Soya bean oil is not a drying oil, but a semi-drying oil, and when some authors claim that it can be used up to 40 percent in a paint vehicle, they are liable to defeat their own purpose. I should say that 20 percent is the absolute maximum under the most favorable conditions, but I would much prefer to see the proportion held down to between 10 and 15 percent.

When used in this way the resulting oil film is apparently as strong as though the soya bean oil were not present, but on the contrary is more elastic and will not turn brittle under conditions that would so affect a film of pure linseed oil. Under proper working conditions I do not consider the admixture of 10 percent of soya bean oil to linseed oil an adulteration. I would consider it more in the light ot the admixture of an inert pigment into a mixed paint; useful in small proportions but harmful when driven beyond its legitimate limits.

The objection naturally arises that if a 10 percent admixture of soya bean oil is desirable, an equal dilution with corn oil, cottonseed oil, paraffin oil or some other substance could be advocated on the same grounds. This would be an entirely wrong conclusion. I cannot state the reason for this phenomenon in scientific terms, but it seems that soya bean oil and linseed oil will amalgamate perfectly, giving a homogeneous film; even if an excess of soya bean oil is used, the oil film will be equally faulty all over by remaining tacky instead of drying hard. Corn oil, on the other hand, seems to draw together in spots, and a mixture of 10 percent corn oil with 90 percent linseed oil would show an uneven appearance, with perfect areas mixed in with wet patches. In the case of paraffin oil, the result would be still more disastrous, as the paraffin oil would sweat out from the film and possibly lift it from the surface in spots so that the paint could be peeled off in strips.

Domestic raw soya oil darkens under heat and breaks badly, something like corn oil. The break is of a dark orange color and quite voluminous. In contrast to this, the Manchurian oil bleaches under heat and shows either no break at all or a very slight one of light coloration. This apparent advantage of Manchurian oil is offset by the fact that the domestic oil lends itself very easily to almost any refining process; there are plenty of oils on the market today that bleach water white without the slightest break. Unfortunately, a great deal of harm was done in the early days of the industry when domestic oil was sold to varnish makers to be used like the Manchurian product and prejudices were created at that time that are still alive in some buyers' chests. There is a firm in Chicago that for years would not buy Manchurian oil from anyone handling the domestic product also. A customer of mine in Michigan, who had ordered through a broker ten barrels of soya bean oil—demanding the cheapest he could buy—was given domestic oil and actually spilled eight drums into the sewer in disgust. A few years ago most chemists would specify Manchurian oil, because none other was then available, thereby unknowingly perpetuating a prejudice, the reason for which has long disappeared.

I remember a curious case that happened in Chicago a few months ago. A large consumer came into the market for thirty barrels of Manchurian soya bean oil. The inquiry was put up to me, but no one had a gallon of this oil left around my territory, whereupon I wired the inquiry to the nearest eastern centers. Before my wires arrived there I received telegrams from three other dealers asking me to quote on thirty barrels of Manchurian soya bean oil at any price. Among all of us we

scared up eleven barrels, for which Mr. Consumer paid something like 14½c a pound. Thereupon I had a conference with his chemist and found out that he wanted the oil for soap making purposes. He had no opinion whatsoever on Manchurian vs. domestic oil, but had specified Manchurian oil because his formula called for it. The purchasing agent in turn had not dared deviate from his chemists' requisition. I had no trouble at all completing the order with domestic oil, and nothing but domestic oil has been used by that firm ever since.

Soya bean oil has certain properties which make it more valuable to the paint and varnish industry than it would be as a mere diluent for linseed oil. For one, it is particularly well adapted for grinding pastes. These paste paints never skin over and hold their original tints remarkably well. In this way the oil is being used in steadily increasing quantities. Soya bean oil further has the property of mitigating the after-yellowing of a white paint or enamel, and in this respect it is without a peer. The trade would pay a considerable premium over the price of linseed oil to obtain soya bean oil for this purpose. Some concerns use soya bean oil in the form of blown oil in connection with this application, but a bleachable, non-break, refined oil, properly treated in the kettle, is probably preferable.

Soya bean oil is also used in caulking compounds and in the so-called asphalt cements where a fairly firm surface is required, but where the underlying mass is required to remain in a pliable condition.

The Market Position of Domestic Oil

THE market price of domestic soya bean oil has constantly been under that of the imported product. In early days this differential may have been justified, but at the present time nothing but ignorance or prejudice can account for a premium for crude Manchurian oil over the refined domestic product. Just what the price of soya bean oil should be depends on various circumstances, on account of the variegated purposes for which it can be used. Price differences may arise that will puzzle the outsider. The paint and varnish trade, for instance, will pay a very substantial premium over the price of linseed oil for that part of the oil which is used in enamels and paste paints, but it will not take on any soya bean oil for the general run of paints unless there is a saving in cost of about a cent a pound. As the amount of oil used for enamels is a limited one, the strange case may occur and has occurred where a dealer may buy a car of crude oil at 9½c a pound in the morning and may not be able to take an additional one in the afternoon unless he could buy it at 8c. The quantity of oil that the paint trade will absorb at about a cent a pound under that of linseed oil is considerable, but much educational work remains to be done along these lines; and after all is said and done, the amount of paint used has its natural limitations regardless of price, and the soya bean industry will have to look for the disposal of very large quantities of oil to the edible or to the soap trades. In these fields, the price of cottonseed oil, corn oil and related products will dictate the market for soya bean oil, and until this stranger in their midst has established its own place, it will have to be sold at a discount. This discount will offer great financial gains to those who are prepared to take advantage of it when the proper moment comes.

The question may be asked why more promotion work in regard to soya bean oil has not been done up to this time. The answer to this is that there has not been enough oil available to go around. Up to the last few weeks, the soya bean oil market has generally been a seller's market, where quantities were doled out carefully among friends and favored customers. The situation has undergone a gradual change and from now on the market promises to be a two-sided affair. There will be times this year when 150,000 to 200,000 gallons of oil per month will have to be sold, and it will be a game of tag between the producers and the consumers as to who works faster. There will undoubtedly be times when the market will become congested and some oil will have to be moved at a sacrifice. There may be other times when careless buyers will find themselves out on a limb. Altogether it will remain a thin market for some time to come, and a thin market always is loaded with sudden and interesting possibilities. The importation of Oriental soya bean oil will probably continue indefinitely. This oil may be refined and reexported in the form of edible products upon which refiners receive a drawback. Under those conditions, the imported oil may be cheaper than the domestic product, as the 2½c duty does not apply. Without duty Oriental oil sells for about 7c a pound, Coast basis.

Specifications Desired

ONE of the matters to be attended to in the near future is the proper definition and standardization of raw domestic soya bean oil. Chemical specifications will do only a small amount of good. Such specifications are designed to protect us from willful adulteration but they never quite fully cover natural variations. What we need more than a definition

of purity is a definition of quality. Chemical specifications have their proper place in text-books, and when used intelligently they also have their proper place in commercial life. Unfortunately, their application is sometimes in the hands of inexperienced and over-enthusiastic young chemists who know too much about books and not enough about life. If they had read in a book that lions roar when the sun goes down, they would, if they were at the receiving end of a zoo, reject as adulterated any lion that would for some reason or other roar in the morning. Most of us still recall the embarrassing situation that arose when chemistry had just set the minimum iodine value of linseed oil at about 180 when in came a big Argentine crop, the oil from which fell way below the point set in these specifications. Nature has its own way of going along, regardless of our text-books. This is a point that should be remembered by those who blindly follow book specifications, even if they lead them out the window.

Fact is that willful adulteration of raw materials is slowly fading into the historical era. I do not pretend to know what the cause is. The cynic may point to the generally low price level of vegetable oils and other paint materials; the lawyer may take delight in pointing out the additional statutes on the books; the economist may ascribe it to the growing size of the producing and distributing concerns; and the optimist will undoubtedly claim a higher standard of ethics among the populace at large. All I know definitely is that in the last year and a half, since I am chairman of the standardization committee for the purity of paint materials in Illinois, not a single complaint has been lodged against any house of fair rating. In the last ten years, I have not heard of a single case of adulterated china wood oil, and I have never heard of a case of adulterated soya bean oil.

Purity Versus Quality

A FEW years ago I bought from an Eastern concern a tank car of domestic soya bean oil of North Carolina origin, "fair average quality of domestic oil." When the tank car arrived it proved to be oil of non-merchantable quality, dark in color and of a rank odor. The car was rejected and the matter was arbitrated before the New York Produce Exchange; but it seemed impossible to obtain a conclusive idea as to what a fair average of domestic oil should be like. There were so few producers at that time that one sample of North Carolina oil, thrown in among the lot, was enough to reduce the standard of quality far below what seemed reasonable. So long as soya bean oil is in use in many lines, each consuming industry should issue its own specifications. The presence of moisture, for instance, is a matter of no concern at all to the soap trade, of small concern to the paint trade, but of considerable importance to the enamel makers. The acid value is of no particular interest to the paint, varnish and enamel trade so long as it is kept within bounds; it is a matter of concern to the soap trade, however, and one of vital importance to the producers of edible fats. No one but the paint maker cares anything about the iodine value; no one but the soap maker for the saponification figure. It is for such reasons as these that general specifications should not be put into use except for the rare purpose of determining the purity of a given sample. Beyond that each industry should work out its own requisitions and trading rules.

It may be of interest to note that Manchurian soya bean oil is imported into Europe in enormous quantities. It seems also strange that it should over there command a premium of about 10 percent over linseed oil. But in respect to this it must be kept in mind that in Europe linseed oil is used largely for edible and soap making purposes. The application of soya bean oil in Europe for the paint and enamel industry is practically unknown, which is not to be wondered at as the European varnish industry is technically decades behind our own. A couple of years ago I did a little propaganda work in Europe and actually exported some blown soya bean oil to Austria, but no lasting results came of it. I have tried to give you in short outlines the present day status of an infant industry with which probably all of us will have to become better acquainted before we are much older. In doing this I feel that I am under the disadvantage of having to present a still photograph of a torrent that should be shown by a fast moving picture. Some of the statements I have made today will be obsolete tomorrow, and the next day new developments may appear of which none of us have dreamed. Within these limitations I have endeavored to present to you an outline of a new industry that is riding in on a high tide and that deserves your serious consideration.

Manila Copra Cable

Copra market quiet and firm with all mills operating. Net receipts down about 30% from January figures and production greatly curtailed. Prices today (Mar. 20) Cebu and Hendagua 11.625; Legaspi 11.50; Manila 11.25.

Preliminary Program of Oil Chemists' Convention

Twentieth Anniversary of Society to be Observed at New Orleans Meeting on May Thirteenth and Fourteenth

The Twentieth Anniversary Convention of The American Oil Chemists' Society will be held at the Roosevelt Hotel, New Orleans, La., on May 13th and 14th. The program of the convention is not yet completed, as this issue of *Oil & Fat Industries* goes to press, but the following tentative program has been furnished us by President Putland.

Monday, May 13th:

10:00 A. M. Convention called to order by E. G. Williams, of New Orleans Arrangement Committee.

Invocation.

Anniversary Greetings from the First President of the Society: Felix Paquin.

Reading of Minutes of Last Meeting.

President's Address: A. W. Putland.

Secretary-Treasurer's Report: J. C. P. Helm.

Address: A Preliminary Report on Cotton-Seed Analysis: G. S. Jamieson.

Committee Reports.

Report of Referee Board: W. H. Irwin.

Tuesday, May 14th:

Convention called to order at 10: A. M.

Address: The Kreis Test as an Index to the Degree of Rancidity: A. S. Richardson.

Address: Further Study of the Method of Determining Oil in Cottonseed.

Address: The Soap Chemists' Section: A. K. Church.

Address: The Cooperative Work of the Texas A. & M. College with the Cottonseed Oil Industry: C. C. Hedges.

Studies on Gossypol: A Progress Report: E. P. Clark.

The Smalley Foundation: H. C. Moore.

The entertainment features of the convention will include an informal dinner on Monday night and the Annual Banquet on Tuesday. A special feature of this year's convention will be a Golf Tournament, under the direction of N. C. Hamner, Chairman of the Golf Committee. All members are urged to bring their golf clubs to New Orleans with them and participate in the Tournament.

Fundamentals

From time to time during the past year there have been drifting into this office certain rumors, mutterings and alarums of a newly organized Secret (more or less) Society, known as the Society for Fundamental Research. It has been very difficult for anyone to estimate the true purpose of this organization. Some have declared it to be a branch of the K. K. K., while others, taking a diametrically opposed stand, have maintained steadfastly against all comers that the deepseated *Fundamental* aim of the organization is the ultimate election of Al Smith.

Oil & Fat Industries, ever in the forefront in giving its readers the real inside dope on all the great civic movements of our day, has spent much time and effort in ferreting out the membership and basic aims of this mysterious organization, and is now able to tell all, which isn't much. At great peril to life and limb (not ours, though), we have obtained a complete list of the membership of this lodge, and we can state without hesitation that it reads like Who's Who (if there's any).

Our intrepid reporter who stole the membership list (just after the secret order's publicity agent had dispatched copies to all the leading periodicals of the U. S. and Canada), was able to obtain only fragments of the Constitution and By-laws, but we are able to publish the astounding news that this organization has been created, *Not* for purposes of fundamental research, as broadcast, but really for the dark and evil practice of *Suppression*.

As nearly as we can decipher the rather involved wording of the Constitution, (probably the member who wrote it had been previously practicing the Order's peculiar methods of suppression), there are just two things to be suppressed, that is to say, put down. One is speeches, and the other is C_2H_5OH. In spite of many hours of tedious effort, involving reference to Sanskrit, Hebraic, Mayan and Milt Gross' dictionaries, we regret to confess that we have been unable to decipher that part of the hieroglyphics which probably reveals which of the two enemies of the lodge is to be suppressed, or put down, first. But who cares about that?

Chemical Exposition

At the Twelfth Exposition of Chemical Industries to be held the week of May 6th at the Grand Central Palace, New York, the most scientific methods of applying research to industry will be exhibited under the supervision of competent representatives of the manufacturers of all types of equipment used in the chemical and allied industries. The engineers and chemists in charge of the various exhibits, acting not alone as representatives of the exhibitors, but also in an advisory capacity for visiting executives and industrial representatives, will stress the value of research and the application of the useful knowledge to be gained through research to industry at large.

At the exposition the prospective purchaser will have the opportunity for direct comparison of products and equipment. It is a well known fact that the greatest impressions are made on customers by a visual demonstration and opportunity for comparison at first hand. Such procedure materially reduces sales resistance and makes the task of selling far easier for the manufacturers.

One of the important dates on the program now being arranged by the Exposition Committee will be Wednesday, May 8th, which has been designated as the date for the meeting of the Technical Association of the Pulp and Paper Industry, at which meeting an elaborate program dealing with engineering and scientific data gathered by exhibitors of equipment used in the pulp and paper industries will be presented.

A great deal of interest in the exposition is being manifested by teachers of chemistry in colleges, academies and high schools, who will be invited to attend conferences each afternoon to discuss the problems of teaching chemistry.

Much International interest is also developing and the management of the exposition has received many letters from foreign countries, asking for information in reference to the exhibits of new equipment, processes, and chemicals, of which there will be many never before exhibited.

The report of the Corn Products Refining Company for 1928 shows net income of $13,192,974 after interest, depreciation, Federal taxes and other charges, equivalent after preferred dividends to $4.52 a share earned on 2,530,000 common shares. This compares with 1927 earnings of $11,905,289, or $4.01 a share.

Export Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces two export opportunities which will be of interest to crushers of oilseeds.

Opportunity No. 36817, A firm in Reichenau, Germany, is interested in the purchase of corn and oilseed cakes.

Opportunity No. 36815, A firm in Toronto, Ont., is interested in the purchase of cottonseed meal.

When writing to the Bureau in reference to either of these foreign trade opportunities, be sure to give the number, as listed above and to mention that you learned of the opportunity from *Oil & Fat Industries*.

A New Gas Flow Meter

The P. H. & F. M. Roots Co., of Connersville, Indiana, well known manufacturers of rotary positive blowers, and of gas, water and vacuum pumps, have recently introduced the Roots Meter, for measurement of gas flow. The new meter incorporates many desirable changes in operating characteristics of gas meters. The reduction in running friction brought about by the improved volume integrator, timing gear set, bearing mounting and recording instrument drive, has not only reduced the amount of slippage present but has affected the relationship of this slippage quantity to the total volume measured.

This changed relationship practically eliminates the necessity of manual correction for slippage on the registered volume. The degree of accuracy obtained by the use of volume readings taken directly from the integrator is well above that universally accepted by the industry.

In order to meet diversified requirements, this metering equipment is built in a large number of sizes with hourly capacities ranging from 100 to 1,000,000 cubic feet per hour. These capacities are based on atmospheric displacement and may be increased by raising the pressure of the gas being metered and correcting the displaced volumes to standard temperature and pressure conditions.

To make these Meters thoroughly adaptable to present-day measurement needs, a complete line of recording instruments has been developed. Through standardization of these instruments it is now possible to interchange them on any Meter, regardless of the latter's size.

Descriptive literature will be furnished by the Roots Company upon request.

Proposed Amendment to Oleomargarine Laws

New Measure Designed to Extend Restrictions on Butter Substitutes to New Cooking Compound Products

REPRESENTATIVE HAUGEN (Rep.), of Northwood, Ia., chairman of the House Committee on Agriculture, stated orally, April 1, that he expected to introduce in the 71st Congress a bill to amend the oleomargarine act.

The new bill, Mr. Haugen said, would be the same as a measure (H. R. 10958) which failed to receive action in the 70th Congress, although reported favorably by the House Committee on Agriculture. The full text of (H. R. 10958) follows:

A bill to amend the definition of oleomargarine contained in the act entitled "An act defining butter: also imposing a tax upon and regulating the manufacture, sale, importation and exportation of oleomargarine," approved August 2, 1886, as amended.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that section 2 of the act entitled "An act defining butter; also imposing a tax upon and regulating the manufacture, sale, importation, and exportation of oleomargarine," approved August 2, 1886 as amended, is amended to read as follows:

"Sec. 2. That for the purposes of this act certain manufactured substances, certain extracts, and certain mixtures and compounds, including such mixtures and compounds with butter, shall be known and designated as 'oleomargarine,' namely: All substances heretofore known as oleomargarine, oleo, oleomargarine oil, butterine, lardine, suine, and neutral; all mixtures and compounds of oleomargarine, oleo, oleomargarine oil, butterine, lardine, suine, and neutral; all lard extracts and tallow extracts; and all mixtures and compounds of tallow, beef fat, suet, lard, lard oil, other animal oil or fat, vegetable oil, annotto, and other coloring matter, intestinal fat, and offal fat—if (1) made in imitation or semblance of butter, or (2) calculated or intended to be sold as butter or for butter, or (3) churned, emulsified, or mixed in cream, milk water, or other liquid, and containing moisture in excess of 1 per centum.

"This section shall not apply to puff-pastry, shortening not churned or emulsified in milk or cream, and having a melting point of 118 degrees Fahrenheit or more."

New Legal Restrictions

THE full text of the section of the report of the Committee on Agriculture outlining the purposes of the bill follows:

The purpose of the amendment, in addition to clarifying the language of the act and including the fish oils and fats, as above briefly mentioned, is to bring a third class of fat compounds, in addition to the two specifically enumerated in the existing law, within the definition of oleomargarine, and therefore within the taxing and regulating power of the Bureau of Internal Revenue.

There have come upon the markets in the United States within the past few years, and ample evidence was placed before the Committee to prove this, a flood of fat compounds, made from coconut oil, imported from outside the continental United States, and a small proportion of peanut oil, under the name and disguise of "cooking compounds." These so-called cooking compounds are made by mixing these fats together in water or some other liquid, so they form an emulsion very nearly identical in its form to the emulsion of butter fat and water, which is butter.

Not only are they emulsified and solidified like butter with moisture incorporated in them like the moisture in butter which is provided for and defined in the Act of 1886 to which this is an amendment, but they are also salted, and in most cases colored with annotto to imitate butter in these two essential particulars. In addition to this there was exhibited to the Committee a synthetic butter flavor which may be used to make these cheap fats have the flavor of butter, when properly blended with the synthetic flavor.

These so-called cooking compounds, made in this manner, are not clearly within the definition of oleomargarine as it is stated in the present law, and as this law is interpreted by the courts. The present law after enumerating the fats used in oleomargarine states that these mixtures and compounds are oleomargarine "if made in imitation or semblance of butter, or when so made if so made calculated or intended to be sold as or for butter," and the courts have ruled that these compounds, although of the same materials except one,

(*Turn to Page* 43)

Of What Benefit a Higher Tariff?

Would It Really Aid the Farmer and Oil Crusher? Is Denaturation a Way to Solve the Problem?

By John B. Gordon

PERSONS claiming to represent dairy, livestock and general farming interests, have appeared before the Ways and Means Committee at Washington and asked for a straight 45 per cent ad valorem tariff on vegetable oils and fats. We should produce our own vegetable oil supply, these men say. Cotton seed oil and soya bean oil are the two sources which they claim could be greatly expanded to make up for the billion pound shortage that would result from shutting out the oils we now import.

Nothing but harm could come from any attempt to get the cotton farmer to produce enough more seed to make up any considerable part of the vegetable oil shortage that would result if imported oils are shut out, even if these oils could be substituted for with cotton seed oil which is not the case.

Farmers do not grow cotton for seed. Seed is a by-product. Even if the vegetable oil tariffs were to increase by one or two cents per pound the oil made from the seed which is not required for planting, would scarcely be noticeable in the income from an acre of cotton. It would, in fact, amount to only 15.1 cents per acre, figured at one cent per pound on the average acre yields in the United States in 1927.

Nothing short of artificial stimulation by propaganda would induce farmers to plant more cotton to secure more seed for oil. Such propaganda would be exceedingly injurious to the South. The whole urge in the South today is to *reduce* the acreage of cotton, rather than increase it, so as to bring better prices for cotton lint. The state legislature of Texas recently considered a law to compel cotton acreage restriction, and the foremost cotton cooperatives are counseling acreage *reduction* rather than expansion.

WILL a duty of 45 per cent really help the American crusher and refiner of vegetable oils, and the producer of other fatty substances? Mr. Gordon believes that it will *not*. He sees in it a boomerang. As Washington representative of the Bureau of Raw Materials for American Vegetable Oils and Fats Industries, he is unalterably opposed to the higher tariff because it will "hamstring" large users of non-edible oils and fats, chiefly the soap industry. As a former instructor in economics at an agricultural college, he sees the proposed duties as economically unsound, and "loaded with dynamite" for the cotton farmer and cotton oil crusher. His views are those most strongly opposed to the new tariff proposals.—The Editor.

Every pound of cottonseed oil and peanut oil being produced in America which is suitable for edible purposes (and practically all of it is) is now being used for edible purposes, in such products as salad oil, lard substitute, oleomargarine, etc. This is a higher priced field in which to sell by far than the field in which the non-drying industrial oils are sold for the manufacture of soap, rubber substitute, tanner's oils, lubricating oils and grease, etc. There is no vegetable oil produced in the South with which to supply these kinds of users. The edible oil people are using it all. Why, then, should any cotton farmer favor increased duties on industrial nonedible vegetable oils? Such duties would mean nothing more than a big increase in the costs of dozens of articles he must buy.

The peanut farmer is in the same boat with the cotton farmer. He does not want to produce a surplus of peanuts over and above what the edible nut men need. If he were to do so, he would be obliged to sell the edible nut men at the same price level at which oil mills could afford to buy, and that price level, it is well known, is much below the edible nut prices.

As regards soya bean oil, there is *much less oil* in soya beans than in cotton seed and proportionately *much more meal*. For each ton of cotton seed oil produced we get about 2.33 tons of meal. But for every ton of soya bean oil produced, we get 7.2 tons of meal. The soya bean cake and meal would pile up three times as fast as cotton seed meal and cake. In crushing soya beans, the oil is really a by-product. The meal is the principal product and there is nothing that can be done by use of the Tariff to raise the price of any kind of oil cake and meal. In 1927 we had to export 785,000 tons of it to Europe. What we would do with more

Natural grouping of oils and fats according to actual usage due to chemical and physical variations of individual oils and fats. This grouping also indicates in general way relative price relationship.

1-Drying Field	*China Wood oil *Perilla oil Linseed oil Soya Bean oil Menhaden oil
2-Edible Field	Lard Cottonseed oil Peanut oil Corn oil Oleo oil Oleo Stearine Edible Tallow Edible Olive oil
3- Nondrying industrial group- all oils in this class to be denatured, i.e., rendered inedible	*Palm oil *Inedible Olive oil *Palm Kernel oil Coconut oil Rapeseed oil *Sesame oil Non drying sea animal oils

This class also includes all offal and refuse oils and fats, such as greases from garbage, tallow rendered from shop fats, etc.

*on free list in tariff act 1922

It is proposed that the following language now in paragraph 1632 Tariff act 1922 be made to apply to all of those oils in bracket three on this page.

"to be duty free if rendered unfit for use as food or for any but mechanical or manufacturing purposes, by such means as shall be satisfactory to the Secretary of the Treasury and under regulations to be prescribed by him.

of it than we now have is hard to see, as while Europe takes our surplus she pays us precious little for it, in proportion to its real value.

Flaxseed is often mentioned as a farm product that could be more extensively grown because of the demand for linseed oil required in paints. Granting that this be true, linseed oil and soya bean oil are classed as "drying oils" and cannot be replaced by such oils as coconut oil, palm oil, palm kernel oil, etc. Linseed oil and soya bean oil are adequately protected by the proposed tariffs, but as already pointed out, the chances for important expansion in the production of soya beans for use by oil mills would have exceedingly hard sledding because of the cake marketing problem.

Since we do not at present grow enough vegetable oils in the United States mainland to supply the demand even for edible oils used in butter substitutes and lard substitute, the stand taken by farm leaders is equivalent to a demand that manufacturers of soap, varnish, tin plate, and other industrial users be forced to use oils now being used for the higher edible purposes. In other words, some of these farm leaders are demanding that higher prices be paid for oils for industrial uses (in an effort to raise prices on edible oils) even though farmers of the United States are not producing the oils needed for these industrial uses.

For illustration: Varnish manufacturers use China wood oil principally. This oil cannot be used in foods; it has a poisonous effect when taken into the stomach. Being forced to pay a 45 per cent duty on China wood oil would have no other effect than to raise the retail price of varnish by perhaps 50 per cent. Producers of the newer cellulose lacquers may be interested in getting this duty on China wood oil in order to plague their rivals, but why should dairy and farm interests help in this raid?

What the Tariff Would Cost

THE farmer is a consumer as well as a producer. He needs to weigh carefully the relative benefits and disadvantages of any proposed tariff. Some agricultural tariffs are of undoubted benefit. The tariff on dairy products is one of the most notable of this class. Other tariffs are merely useless. But the proposed indiscriminate tariff of 45 per cent ad valorem on all vegetable oils and fats, is worse than useless. It would work a positive injury to nearly all classes of farmers and would fail utterly to accomplish any material benefits for its chief backers, spokesmen who claim to represent the dairy groups.

Imported inedible oils and fats enter into a surprisingly large number of articles of common use and are required in a large number of industries. In addition to the better known uses such as for soaps, paints, varnish, linoleum, etc., large quantities are used by tanners in finishing leather, by textile mills both in finishing and in washing fabrics, and by steel mills for finishing tin plate. Every leather belt and every piece of harness requires dressing with oil mixtures; much machinery, including automobiles and our merchant marine fleet which carries our commerce over the seven seas is lubricated in part by vegetable oils.

The increase in prices of manufactured articles that would be necessary if an effective tariff were imposed on inedible vegetable oils would vary, of course, according to the percentage of oil contained, but a 45 per cent ad valorem tariff on vegetable oils would cause a 50 per cent increase in the selling price of laundry soap for instance and the effect would be as heavy in some of the other industrial products.

Fish oil manufacturers in the East are working under the farm banner to get a high tariff on vegetable oils. They see a chance to force paint makers, tanners, and soap manufacturers to use fish oil at higher prices. That is good business for the fish oil people perhaps, but where does the farmer get off who must buy the higher priced paints, shoes and other leather articles, soaps, and numerous other products?

Rapeseed oil is used extensively as a lubricant in ships and automobiles. Rapeseed is not grown in the United States and never would be, yet farmers are asking a 45 per cent increase in the tariff on this oil which they themselves use.

The cost of tariffs on oils and fats would not be reckoned only in increased prices to farmers and other consumers. It must also be reckoned in terms of decreased consumption, not only because of increased cost but because of substitution. For illustration, R. J. Kinzer of the American Hereford Cattle Breeders Association writes me under date of February 13th "when it came to the matter of oils and fats, we did not make any recommendations at all. It is a feeling of some of our Committee that in case higher protective tariff was placed on these products it would only encourage the use of substitutes." There can be no sounder reasoning.

All manufacturers of industrial products made from oils and fats, both vegetable and animal, are constantly warred on by substitutes, *and these substitutes contain no fats and oils at all.* Soaps must battle with chemical washing

powders. Varnish must war with cellulose lacquers. Rubber substitutes must compete with the genuine article—rubber. Tanners' oils must wage war with petroleum products. Lubricating oils containing vegetable oils must battle with straight petroleum lubricating oils. Candles made from fats must compete with candles made from paraffine. And so it is clear on through the gamut of products made from oils and fats. Almost all of them skate on thin ice and any attempt to increase their burden of cost in the way of tariffs imposed on raw materials will force them through the ice and the competitor who cannot be so burdened goes on to win the race for the consumers' favor.

The cost of the duties on industrial oils and fats must be computed in yet another manner: A recent news release from the Department of Commerce calls attention to the fact that the non-manufacturing areas, from whence come the oils and fats discussed here, are using raw materials (such as these oils and fats) to pay for all kinds of American merchandise from automobiles to condensed milk. If these imports are shut off, then our exports to the non-manufacturing areas are simultaneously clipped off!

By Denaturation

AFTER long and careful study of the equities of the case the industrial users of oils and fats propose a solution which should be acceptable to all sincere and legitimate farm representatives. Users of oils for industrial purposes propose that all questions of interchangeability of oils (a badly misunderstood expression) be removed, so far as imported oils are concerned, by denaturizing. That is, all oils that are to be brought in for industrial purposes would be required to be treated, under Federal supervision, with a substance that will render them unfit for food. This plan of denaturizing low grade olive oils to keep them from going into foods, has been used by the Federal government for more than 20 years and without any difficulties. All oils not so denaturized, irrespective of their country of origin, and intended to enter into competition with edible oils produced in the United States, would be required to pay an adequate import duty. By this means dairy interests would be protected against coconut oil now used in making butter substitutes; there would be an ample market at enhanced prices for all the cottonseed oil, corn oil and other edible oils produced in this country, yet the soap, tanners, varnish and numerous other manufacturers would still be able to get moderate priced supplies of inedible oils and the prices of the articles manufactured from them need not be increased to the consumer.

Johns-Manville Acquires Celite Products

The entire business of the Celite Products Co., of Los Angeles, manufacturers of Supercel, Filtercel and other adsorbent earths which have wide use as filter aids, and of Sil-O-Cel insulating material and refractories, as well as Celite for concrete, has been purchased by the Johns-Manville Corporation of New York. The Johns-Manville Corporation has taken over the mines of the Celite Products Co. in California and the entire production and sales organization.

The business of the Celite Products Co. will be carried on and developed by the new owners along the same lines as in the past and it is expected that the distribution of Celite products will be materially expanded because of the great scope of Johns-Manville's distributing organization, with offices in all important North and South American cities. Mr. Arthur S. Elsenbast, for many years Filtration Engineer of Celite Products Co., will continue as Manager of the Filtration Department of Johns-Manville.

Professor T. P. Hilditch, of the University of Liverpool recently presented before the Manchester Section of the Society of Chemical Industry a paper entitled "Recent Advances in our Knowledge of the Structure of the More Common Fats." In his paper, Dr. Hilditch reviewed the progress of analytical methods for fats and oils to their present-day efficiency, which is such as to permit the interested user of any of these products to have complete data on their composition and structure.

Two-thirds of the raw materials utilized in Japan for soap manufacture are obtained by the hydrogenation of oils, chiefly whale, fish and soya bean oils. To avoid Australian domination in their markets, the Japanese wish to make themselves independent of the world with an abundance of fish and soya bean oils. The annual Japanese production of whale oil is valued at three to four million yen, nearly half of which production is exported.

Notes of the Industry

Import 30,000 Tons Soya Meal

Between 15,000 and 20,000 tons of soya bean meal are imported annually, according to a letter received by *Oil & Fat Industries* from E. L. Cocke, assistant secretary of the Ashcraft-Wilkinson Company, Atlanta, Ga. Mr. Cocke's letter is in reply to statements made in an article in the February issue of the publication, and states:

"On page 26 of your February, 1929 issue the following sentences are contained in your article entitled 'The Consumers' Side of the Tariff': — 'Unless a satisfactory market can be found for this cake the production of soya beans cannot expand extensively. This finding of a satisfactory market for soya bean cake would be difficult because soya bean cake and meal would be in competition with the products of every farmer who grows feeds.'

"It is not my desire to engage in controversy, but the above statement that it would be difficult to find a satisfactory market for soya bean cake and meal is so erroneous and so misleading I think it should be corrected. The contributor of the article probably does not realize that the growing of soya beans in America, especially the central western states, affords a new revenue of profit to the farmers.

"As far as the demand for soya bean cake and meal is concerned, it has been necessary to import 30,000 tons annually to the Pacific Coast. We ourselves have participated in this importation to the extent of several thousand tons.

"Instead of it being a problem to find a satisfactory market for soya bean cake and meal, the real problem is to get a satisfactorily large enough domestic production. All dairymen will tell you that the protein market in America is entirely too high as evinced by the present $50.00 to $64.00 per ton price for domestic protein concentrates such as cottonseed meal, gluten meal and linseed meal. These actual facts should be given due consideration."

The Third Annual Convention of the Mayonnaise Products Manufacturers Association will be held at Atlantic City on October 28, 29 and 30. Convention headquarters will be at the Hotel Traymore and this progressive organization of mayonnaise manufacturers expects a record-breaking attendance.

Norwegian Codliver Oil

Steps to improve the quality and uniformity of the medicinal codliver oil exported from Norway are being taken by the government of that country, according to a report from Marquad H. Lund, United States commercial attache at Oslo.

Codliver oil intended for domestic consumption has been under government supervision for some time and regulations have just been issued to extend similar supervision to oil extracted for export which is intended for medicinal purposes and human consumption. These regulations have not yet been published in detail, but it is understood that they will confine the pressing of oil for human consumption to cod, haddie and coal fish. Inspectors under the Norwegian Ministry of Commerce will examine plants, equipment, methods and raw materials of the oil extractors, and detailed regulations are to be issued regarding the permissive practices in manipulating the livers. Each export shipment is to be certified by a chemist licensed by the government, and the Ministry of Commerce will prescribe the method to be used in determining the vitamine content of the oil. Producers are to pay a tax of 1 Kr. (26.3 cents) per 100 kilos for this service.

Mr. Lund reports that leaders in the Norwegian codliver oil industry are pointing out the need for a central organization for the exportation of their oil, and propose rigid standards of quality and grading and exploitation under a single trade mark, similar to the export machinery for cheese in Switzerland.

Officers of the British Seed, Oil and Cake Trade Association have been elected as follows: — President, Edward Eric Billington, managing director of Edward Billington & Son, Ltd., Liverpool, and director of W. E. Criddle & Son, Ltd., Liverpool; vice-president, Alexander Chrystals, of James L. Turnbull & Co., Liverpool; treasurer, E. H. Wharton-Davies, managing director of the Cattle Food Supply Company, Ltd., Liverpool and London. W. B. Bibby, J. Bibby & Sons, Ltd., Liverpool, and P. F. Orford, Joseph Crosfield & Sons, Ltd., Warrington, were re-elected to the executive committee.

Liquidating Reduction Plant

Consolidated Products Co., New York, used machinery dealers, have bought the $3,000,000 garbage reduction plant on Staten Island, N. Y., formerly operated by the Metropolitan Disposal Co. and the New Departure Reduction Co. They are now in the process of liquidating the equipment. This includes 179 Bartlett & Snow steam jacketed crystallizing kettles, over 250 tanks of all sizes and types, from 5,000 to 550,000 gallons capacity, 5 boilers of 625 horsepower, 25 pumps, motors and other miscellaneous machinery.

Wood Oil Imports Decline

Exports of China wood oil to the United States from Hankow during February totaled 2,756,000 pounds, a decided drop from the corresponding month of 1928 when 6,919,990 pounds were reported, according to a cable just received in the chemical division of the Department of Commerce from the American consul at Hankow. Shipments to this country in January totaled 12,323,465 pounds. Exports of wood oil to Europe amounted to 560,000 pounds, against 1,948,100 pounds in the preceding month and 1,035,265 pounds in February a year ago. Stocks at Hankow at the close of February were estimated at approximately 5,000 short tons, compared with 700 tons February 29, 1928.

Export Tax Cancelled

The Hankow Surtax Bureau in an order issued in January, placed an export tax of $2. per picul on tung oil exported from Hankow. The new tax did not remain in effect, however, as a review of the new export tax caused the Minister of Affairs, Chinese Government, to publish a decree rescinding the new tax.

Cook, Swan & Young Sold

Receivers of the Cook, Swan & Young Corporation have been ordered by Judge Runyon to accept the offer of $245,000 made by Gilbert P. Smith, president, and J. Howard Smith, a director of the company, for the plant at Bayway, N. J., land, building, machinery, corporate name and good will, providing a better offer is not made to the court or receivers prior to April 15th, in which case the court will withhold designation of the successful buyer until April 19. The Smiths also intend to take over the inventories, chiefly stocks of crude and refined oil, at inventory costs less discounts of from 10 to 20 per cent.

Glidden Expands

Adrian D. Joyce, president of the Glidden Company, in a letter to the stockholders explaining the purpose of the proposed increase in capital from 500,000 to 600,000 shares, advises that the company has acquired control of the Metals Refining Co., Hammond, Ind.; the Voco Nut Oil Products, Inc., Berkeley, Cal.; the Dunham Mfg. Co., Brooklyn; the Wisconsin Food Products Co., Jefferson, Wis., and The Troco Food Products Co., Chicago.

Mr. Joyce estimates that the acquisition of these concerns, with sales aggregating more than $13,000,000 last year, will increase the business of the Glidden Company by nearly 50 percent. Sales of the Glidden Company for the four months ended February 28 exceeded those of the same period a year ago by $1,100,000.

Butter Trade Falls Off

Exports of dairy products from the United States have declined since 1925 and in 1928 were the lowest since 1922. In 1928 they had a value of $2,732,080—$353,665 less than in 1927. Exports of butter had a value of $1,860,773, cheese $798,744, and milk and cream $72,563. Exports of butter and cheese decreased, and those of milk and cream increased slightly, as compared with 1927. Imports of dairy products in 1928 had a value of $32,248,952, which was $3,508,615 lower than the value of those of the previous year. Of this import value, $24,695,314 was for cheese, $5,897,726 for cream, $1,659,402 for butter, and $996,510 for milk. Imports of cheese and milk were larger, while those of cream and butter were lower than in 1927—the butter imports being the lowest since 1918.

Exports of whale oil to the United States from Victoria, British Columbia, for the year 1928 amounted to 1,053,304 pounds with a value of $49,347 as compared with 2,320,000 pounds valued at $89,323 for the previous year.

The following figures are the exports of fish oils from Bergen, Norway, for the period of January 1 to January 26, 1929:—

	Barrels
Medicinal Cod Liver Oil	5,776
Industrial Cod Liver Oil	3,509
Greenland Shark Oil	248
Hardened Whale Oil	1,148
Whale Oil	179
Seal Oil	717
Herring Oil	12,972

Palm Oil Merger Planned

The African & Eastern Trading Company and the Niger Company, the two largest and oldest concerns engaged in the African palm oil industry, are to be merged. This was announced in cables received in New York early last week from London where the headquarters of the companies are located. At the offices of these companies in New York only the fact that plans for the merger have been completed was known, and final details are not expected to be available for several days or, perhaps, not for a week or two.

It is estimated that the African and Niger companies, which have been in existence for many years, now control about two-thirds of the palm oil industry of West Africa, the Niger company being a very important factor in the trade with this country. The New York offices of the Niger Company are located at 82 Beaver street, under the management of J. H. Redding, while the offices of the African & Eastern Trading Company are at 8 Bridge street, under the direction of R. G. Morris. Both companies also have branch offices in various other large cities in Europe and the Far East.

Tri-States Superintendents

Cottonseed oil mill superintendents from all over the Tri-States will establish headquarters at the Auditorium, Memphis, Tenn., June 18-19-20-21, for their annual convention.

All Memphis concerns representing out-of-town manufacturers will have exhibits at the Auditorium. Entertainments will be held at the Hotel Peabody.

R. D. Ryan of Bellevue Cotton Oil Co., president of the association, announced that oil mill superintendents from Illinois and Indiana would be invited to attend the exposition.

Leningrad Margarine Factory

The "Maslobone Zhirovoye Dyelo" states that the projected Leningrad margarine factory has been confirmed. This factory is designed to produce twenty tons of margarine, and it will be built on the ground of the Kassnaya Svyezda oil factory, next to the town slaughter-house, as it is particularly convenient for the supply of raw materials. (Report from Assistant Trade Commissioner Frank Messenger at London, England.)

Solvay Issues Booklet

The Solvay Sales Corporation of 40 Rector Street, New York, has issued a most attractive brochure describing the alkali products of the Solvay Process Company, for which the former organization are exclusive sales agents. The booklet describes the grades, qualities and uses of soda ash, caustic soda, modified sodas, calcium chloride, chlorine, ammonium chloride and various chlorinated products, among others. Many useful tables relating to the dilution of alkali solutions and their properties are included. The booklet will be mailed without charge to any user of alkali products upon request.

The operation of revised freight rate schedules which involve substantial reductions in the freight rates on imported flaxseed from gulf ports to interior points was suspended by the Interstate Commerce Commission and an investigation ordered in I & S docket 3254.

The railroads proposed to establish proportional import commodity rates on carload shipments of flaxseed, so that, from New Orleans, the present rates of 77 cents per 100 pounds to Fredonia, Kans., and 56 cents to Kansas City, Mo., would be reduced to 30 cents per 100 pounds, while the present 60-cent rate to Omaha, Neb., would be reduced to 37 cents per 100 pounds.

P. H. Dorsett, agricultural explorer of the United States Department of Agriculture, and W. J. Morse, soybean specialist of the department, left Washington recently on a two-year expedition to the Orient. Soybean culture in Japan, Chosen, Manchuria and Java will be one of the main features of the exploration program.

The D. H. Litter Co., Inc., New York and Philadelphia, have been appointed exclusive selling agents for the Pacific Vegetable Oil Co. of San Francisco, who supply wood oil direct from the Orient. Stocks are carried in the East.

Arthur F. Berglund, Secretary of the Archer-Daniels-Midland Company, died at his home in Minneapolis on March 20, of pleural pneumonia. Mr. Berglund had been associated with the Midland and Archer-Daniels-Midland companies throughout his business career.

A Market Opportunity

Donald Renshaw, American Trade Commissioner at Singapore, writes to the Bureau of Foreign and Domestic Commerce, Department of Commerce, that a good market exists in the Straits Settlements for a cheap vegetable oil for cooking or eating purposes. There is considerable peanut oil consumed by the Chinese, who form a considerable portion of the population, but Mr. Renshaw advises that there is a demand among importers for other grades of oil. The complete text of his letter is as follows:—

7A, Ocean Building,
Singapore, S. S.

Director, Bureau of Foreign and Domestic Commerce,
Department of Commerce,
Washington, D. C.

Reference: 30.

SUBJECT: Samples of Vegetable Oil.

There is a good market in Brisish Malaya for a cheap vegetable oil, suitable for cooking or eating purposes. Statistics unfortunately do not separate cooking oils from fats, hence the extent of the local market is unknown, but from importers we learn that among the native population vegetable cooking oil is a staple article.

Peanut oil is a very popular oil among the Chinese, who use it for many purposes in addition to its use as a cooking oil. During 1927, the local market consumed over 220 tons of peanut oil alone valued at $2,500,000. Hongkong and China furnished practically all of this oil.

Corn oil and coconut oil have a limited sale here. It has occurred to us that possibly some of our cheaper grades of vegetable oil might be introduced to this market by having some American manufacturers send us samples together with c. i. f. prices. The actual possibilities of cotton seed oil and corn oil in this market are frankly unknown to us, until they have been tried out.

If American manufacturers could be interested, we, for our part, will be glad to see that the samples are properly tried out by interested importers.

Signed: Donald Renshaw.
American Trade Commissioner.

The oil storage building at the plant of A. Gross & Co., makers of stearic acid and red oil, Newark, N. J., which was destroyed by fire recently, is being rebuilt and is expected to be ready for occupancy in about a month.

Procter and Gamble Company have issued $12,500,000. of 5% cumulative preferred stock, par value $100. per share. Proceeds will be used to reimburse the treasury of the company for the redemption of the outstanding 6% cumulative preferred stock at 110 and accrued dividends, to provide funds for the large new plant now in course of erection at Baltimore, and for other corporate purposes.

Wesson Oil & Snowdrift Company, Inc., has declared a 100 percent stock dividend, payable to stock of record February 28.

Mathieson 300% Dividend

In announcing a stock dividend of 300 percent recently, the Mathieson Alkali Works declared one of the largest bonuses of the current year. This dividend is subject to the approval by the stockholders of an increase in the authorized common stock from 200,000 shares to 1,000,000 no par shares. The payment date of the dividend will be announced at a later date.

The annual report of the American Tung Oil Corporation is being distributed to the industry in a 10-page booklet. Excerpts from the report of Ludington Patton, president, follow:—

Development of the groves was continued during 1928. There was obtained from the groves approximately 30,000 pounds of tung oil fruit. This fruit has been carefully separated, the cluster variety being held in reserve for planting purposes, while the single fruiting variety will be used for crushing tests at the new mill recently erected in Gainesville by the Alachua Tung Oil Company. Many requests for seed for 1929 planting have been received by the corporation.

Estimates have been made which indicate that up to the fall of 1928 the acreage of tung oil planted in Florida as a result of the educational work of the American Tung Oil Corporation may aggregate approximately 4,000 acres. Further indications are that during the winter of 1929 an additional 1,000 acres of tung oil trees may be planted in the State of Florida.

After December 31, 1930, it is expected that the groves may be self-sustaining, and that the income from sales may be sufficient to keep the groves in condition in the future.

Ralph Bolton, president of the Ankeny Linseed Manufacturing Company, died at his home in Des Moines, Ia., on March 15, of acute asthma and heart disease after a very short illness.

AMERICAN OIL CHEMISTS' SOCIETY

Notes and Correspondence

Oil Chemists' Golf Tournament

N. C. Hammer, Chairman of the Golf Committee of The American Oil Chemists' Society Twentieth Anniversary Convention at New Orleans, May 13th and 14th, announces that the golf tournament to be held in connection with the convention will be a large and important event, with prizes offered in all handicap classes and a blind bogey handicap as well, which will give each participant the opportunity to win a prize. All members of the Society are urged to be sure to bring their golf clubs to New Orleans with them and take part in this tournament.

"Official" Cotton Seed Analysis

By LEHMAN JOHNSON

THE consensus of opinion among chemists who are called upon to make complete analysis of cottonseed, which includes, 1—Moisture, 2—Oil, 3—Ammonia and 4—Free fatty acids in the oil; is that the present "Official cottonseed analysis," as provided for in Rule 269 of the Interstate Cotton Seed Crushers' Association, must be discarded and a better method found and adopted in its place. The method is so poor and gives such discordant results that it is hardly worth while discussing except to point out its faults for the bearing they may have on finding a better method.

The faults of the "official" method are:—

1st Three different portions of the sample to be tested must be taken to secure the four analyses, a very decided objection and prolific source of error in material as irregular as cottonseed.

2nd The oil and ammonia tests are dependent for correctness upon two different tests for moisture on different portions of the sample, that is upon a test which at present is the least satisfactory and least uniform among chemists, namely the moisture test.

3rd A preliminary treatment of the seed by a chemical, HCl, is required before the analysis is begun, a decided disadvantage even if, as some chemists contend, increased solubility of something in the seed is not caused thereby, which would vitiate the oil test and certainly prevent the possibility of the free fatty acid test being made on the same portion on which the oil test is made.

4th "The eating of the pudding," the use of the analytical methods in practice on varying conditions of seed and by different chemists, shows that they are neither chemist nor fool proof. Complaint is loud and long against them.

Keeping these faults in mind and profiting by them it will certainly be a great gain if

A—We can simplify and render less expensive the over-elaboration of the cottonseed test.

B—We can carefully take one *and one only* portion of the sample of sufficient quantity to be fairly representative and make from that the four required tests.

C—We can use more of the chemist's inexpensive chemicals and thereby save more of the chemist's expensive time.

I suggest the procedure below and ask all chemists interested to set to work immediately on it to that we may present it or something better for adoption at our annual convention of the American Oil Chemists' Society in May.

Suggested Procedure for Simplified Seed Analysis

1—Take with all proper precautions a single portion of ten grams plus a leeway of one or two seed of the cleaned cotton seed as nearly representative of the sample as received as possible and make all four determinations on this single portion as follows:-

2—Crack, without grinding or separating, the entire portion in a mortar.

3—Weigh out exactly ten grams into a tared or balanced moisture dish.

4—Dry exactly four hours at 102-3 degrees C. for MOISTURE.

5—Immediately, without absorption of moisture, grind in an iron mortar (ten inch best with good heavy pestle) the whole after adding 2.5 grams of ground glass to the uniform mixture which is easily possible.

6—Place the whole in filter papers, using a Butt tube and a 50 cc. extraction flask having a file mark on the next showing 66 cc. contents when filled to this mark.

7—Add 30 cc. of the standard petrolic ether and extract four hours without regrinding.

8—Without evaporating the ether fill with more ether to the 60 cc. mark.

9—Mix thoroughly till all fat is dissolved. Remove and set aside for the free fatty acid test 30 cc. of the mixture.

10—Evaporate off the ether from the half portion remaining in the flask and weigh for OIL.

11—Remove the entire residue from the filter into an 800 cc., Kjeldahl flask which has a file mark on the neck to show when filled to 900 cc.

12—Add 1 gram of mercuric oxide, 15 grams of postassium sulfate and 50 cc. of sulfuric acid.

13—Digest in the usual way (the previous removal of the oil and moisture makes this fairly easy).

14—Fill with water to the 900 cc. mark. Pour off 600 cc., preserving in case duplicate or triplicate test for ammonia is wanted. Add the usual reagents, distill as usual and calculate AMMONIA.

15—Return to the 30 cc. petrolic ether oil solution. Add 15 cc. of neutral alcohol, 0.5 cc. of 1% phenolphthalein solution and titrate with tenth-normal alkali. The weight of the oil is known from the other half evaporated off for oil and the calculation is easy for—FREE FATTY ACID.

I happen to have a large sample of uniform cottonseed on which much cooperative work is being done and of which I will send a portion to any chemist applying who will send 10 cts. in stamps for container and postage and will report his results to me.
Memphis, Tenn.

Goldsboro, N. C.

The Editor,
Oil & Fat Industries,
New York, N. Y.

Sir:

Your readers may be interested in the following modification of the method for determining ammonia in cottonseed, which contains nothing new except the large quantity of seed taken for the analysis. I have tried out this method pretty thoroughly and have found it very satisfactory. The method is as follows:-

Weigh 17 grams of cottonseed into a Kjeldahl flask containing 2.5 grams metallic mercury, or its equivalent in mercuric oxide, and 50 grams anhydrous sodium or potassium sulphate. Add 125 ml concentrated sulphuric acid and digest for two hours. Cool. Make up to 500 ml and pipette 50 ml aliquot into the usual distillation flask. Add about 300 ml water and sufficient sodium or potassium sulphide solution to precipitate the mercury (half the quantity usually used is sufficient, since the aliquot employed contains only 0.25 grams of mercury). Add slightly more than enough sodium hydroxide solution to neutralize the acid present—the aliquot used contains 12.5 ml acid. Add zinc and distil in the usual manner, calculating the results on the basis of 1.7 grams sample. It is better to use an 800 ml Kjeldahl flask for the digestion because when such a large sample is used serious frothing sometimes occurs if the smaller flask is used. It will be found convenient to have a mark on the digestion flask at the 500 ml level so that the melt may be diluted to the proper volume without transferring to a regular volumetric flask. Distillations should be done in duplicate.

Very truly yours,
W. B. Byers

19, Lockwood St.
Driffield.
Yorks. E.
England.

The Editor,
"Oil and Fat Industries"
136, Liberty St.
New York.
U. S. A.

Sir:

I am very sorry to see from the Editorial Note on Page 43, Vol. VI, No. 1, of the *"Oil and Fat Industries"* that I have not made myself clear on the question of heating with either hot water or with steam at the same temperature.

Your note refers to the amount of heat given up by saturated steam when heating another medium, being itself condensed at the same pressure in so doing. My remarks in the first paragraph that you asterisk refer neither to the amount of heat nor to the available heat on condensation.

You will see on re-reading the paragraph that my remarks refer entirely to the subject of rate of heat transference and the only reference to amount of heat is in reference to the furnace heating the two media. Unfortunately in paragraphing, a device not adopted by me in my original paper, you have separated the statement "the furnace is only called upon (in the case of the hot water closed circuit) to make good the loss" from its context. Moreover you have lost sight of the fact that rate of

transference is the subject of the sentence and *not* quantity of heat transmitted.

In the second statement that you asterisk I state that the "Sensible Heat" is liable to be lost. Since the "Total Heat" of the steam is this "Sensible Heat" plus the "Latent Heat" it follows that if the latent heat is used, as stated in the note, that the sensible heat is liable to be lost and thus my statement and your note on it are only different ways of saying the same thing. As you go on to remark, even this sensible heat may be largely recovered and I, in my paper, carefully covered this aspect by saying that the sensible heat is *liable* to be lost.

Under any given set of conditions it is the temperature of the heating medium which determines the actual rate of transference of heat. Now the question which I set myself to answer was "What is the comparison between the heat which must be supplied to cold water in order to use it as a heating medium in the form of (a) Hot water under pressure; (b) Steam at the same pressure. You will notice that the quantity of heat available for heating from the media did not enter into the question at all.

The answer to the question is that the hot water will require less heat than the steam to the extent of the latent heat of the steam for the pressure. (Note;—Owing to slight differences in the specific heats of the steam and of the hot water this answer is not *theoretically* accurate, but for all practical purposes it is.)

You will thus see that the statements as read are in order and therefore must stand as they were read.

You will pardon the length with which I have dealt with this matter but if the result is that a little less confusion exists regarding the matters of heat transference and quantity of heat transmitted the discussion will have been worth while.

Thanking you for the opportunity you have given me for replying to your Editorial Note, I am,

Yours truly,
THOMAS ANDREWS.

Louis M. Roeg, since 1925 chief chemist of Brewer & Company, Inc., Worcester, Mass. and recently reappointed Chairman of the Olive Oil Committee of The American Oil Chemists' Society, has become Sales Manager of Lucidol Corporation, Buffalo, N. Y., manufacturers of organic peroxides, which are used for bleaching oils, fats and waxes, as well as other substances.

Referee Applicant

Mr. Harry M. Bulbrook, Industrial Laboratories, Fort Worth, Texas, has applied for Referee Chemist's Certificate of the American Oil Chemists' Society on all products covered by the Rules of the Interstate Cottonseed Crushers' Association.

Conventions Scheduled

The thirty-third annual meeting of the Interstate Cotton Seed Crushers Association will be held May 15 to 17 at the Roosevelt Hotel, New Orleans. The rules committee will be in session May 13 and 14, also at the Roosevelt.

Arrangements have been made for reduced railroad rates on the certificate plan.

The program for the convention will include many important subjects for discussion and problems to be solved, among them the code of trade practice, unification or reorganization, seed grading and the like.

The thirty-fifth annual convention of the Texas Cotton Seed Crushers' Association will be held at El Paso June 5 to 7. The rules committee will meet June 3 and 4.

Swift & Co. has filed a complaint with the Interstate Commerce Commission seeking lower freight rates on shipments of fertilizer and fertilizing compounds from its plant in Baltimore to points on Long Island.

Exports of China wood oil from Hankow

Tunis Boosts Oils Duties

The duty on olive oil, pure or mixed, exported from Tunis to all destinations has been increased from 35 francs to 40 francs per 100 net kilos. The decree also increases the duty on olive husk oil exported to France or Algeria from 2.50 francs to 7.50 francs per 100 net kilos, effective on the same date. Another decree, effective January 1, increases the export surtax on olive husk oils originating in the fourth and fifth regions of Tunis from 1 franc to 1.50 francs per 100 net kilos. The duty on olive husk oil exported to foreign countries remains 15 francs per 100 net kilos.

V. H. Hunter, broker in vegetable and fish oils and New York representative of the Werner G. Smith Co., has removed his offices from the Woolworth Building to Room 3102, Chanin Building, 42nd St. and Lexington Ave.

Market Report on

FATS, OILS AND GREASES

(As of April 1, 1929.)

NEW YORK—The price trend for oils, fats and greases was generally downward throughout the recent period, a usual occurrence at this time of the year. The downward movement was accentuated by the uncertainty about contemplated tariff action. Consumers were holding off their purchases until they could learn what action to expect from Congress on the proposed tariff changes. Coconut oil and tallow were substantially lower. Corn oil lost its recent price gains. Cottonseed oil and linseed oil were both slightly lower as a result of forced liquidation on the various exchanges. Olive oil, olive oil foots and red oil were unchanged, with stearic acid lower. The only firmness noted was in rapeseed oil. Grease was slightly lower in keeping with the generally easier conditions in the market.

Coconut Oil

Coconut oil prices declined all along the line, and the various oils were quoted ¼c to ¾c lb. lower than at the close of last period. The offerings at these prices were light, keeping the market steady. Ceylon bbls. were priced at 9⅛c to 9¼c lb., with Manila at 9c to 9⅛c. Coast tanks were at 7⅝c to 7¾c lb. for Ceylon and Manila grades. Copra was lower at 4⅝c to 4¾c lb.

Corn Oil

Crude corn oil was priced substantially lower than at the close of last period. The recent price gains were pretty well wiped out during the period as a result of the general weakness of the market. Tanks were quoted at 8½c to 8⅝c lb., with bbls. at 11c. Refined was still priced at 12c, and the fatty acid at 11c.

Cottonseed Oil

The influence of the securities market caused a slight drop in the price of cottonseed oil. Prices were quoted lower as support was withdrawn from the market. The closing quotations were: crude, 8¾c lb.; P. S. Y., 10½c to 10¾c lb.; fatty acid, 11¼c lb.

Grease

Quotations were lower on all the greases in harmony with conditions in allied products. Demand was inactive. White grease was priced at 8⅜c to 9¾c lb., yellow and house at 8⅛c to 8¼c, and brown at 7⅞c to 8c lb.

Lard

Lard resisted the general tendency toward decline, and advanced ¼c lb. to 12c lb. on city tierces. Compound was slightly lower at the close, being priced at 12¼c to 12½c lb. Demand was moderately active.

Linseed Oil

Linseed lost the 10c a hundred gain which was recorded in the previous period, with the result that the base price for crude oil in car lots is now back at 10⅛c lb. Boiled oil in tanks was quoted at 9⅞c, with refined in bbls. at 10⅛c lb. Caked and meal were still unchanged in price.

Olive Oil and Olive Oil Foots

In spite of the fact that stocks were light and future deliveries uncertain, there were no changes in the prices of olive oil or olive oil foots. An advance might well have resulted, had it not been for the generally weakened condition of the market. Closing prices were $1.35 to $1.40 for oil, and 10½c to 11c lb. for foots.

Red Oil and Stearic Acid

Red oil was unchanged at previous prices. The market was quiet, but consumption was proceeding normally. The price of stearic acid dropped off during the period as a result of easier conditions in raw materials. Demand continued active. Double pressed was quoted at 16½c to 17c lb., with triple pressed at 18c to 18½c.

Rapeseed Oil

The market on this oil was firm due to reports from India that the yield of seed was expected to be about ⅛ below normal. Refined oil in bbls. was quoted at 86c to 87c lb.

Tallow

Tallow was quoted ¾c lb. under last month's closing quotations on all grades. Competition among sellers, coupled with the generally weak condition of the market caused the decline. Edible was priced at 9⅜c to 9⅝c lb., city extra at 8½c, and special at 8¼c.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¾	.14
No. 3, bbls.	lb.	.13¼	.13½
Chinawood, bbls. or drs.	lb.	.14½	.14¾
Coast, tanks, spot	lb.	.13	.13⅛
Futures	lb.	.13	.13⅛
Coconut, Ceylon grade, bbls.	lb.	.09⅝	.09¼
Coast, tanks	lb.	.07⅝	.07¾
Cochin grade, bbls.	lb.	.09⅜	—
Manila, bbls.	lb.	.09	.09⅛
Tanks, N. Y.	lb.	.08	.08⅛
Coast tanks	lb.	.07⅝	.07¾
Fatty acids, mill, tanks	lb.	.12	—
Cod, Newfoundland, bbls.	gal.	.63	.64
Copra, bags, Coast	lb.	.04⅝	.04¾
Corn, tank, mills	lb.	.08½	.08⅝
Bbls., New York	lb.	.11	—
Refined, bbls.	lb.	.12	—
Fatty acid	lb.	.11	—
Cottonseed, crude, tanks, mill	lb.	.08¾	—
P. S. Y.	lb.	.10½	.10¾
Fatty acids, mill, bbls.	lb.	.11¼	
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03¾	.04¼
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08¼	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbls. N. Y.	lb.	.08⅜	.09¾
Yellow	lb.	.08⅛	.08¼
Brown	lb.	.07⅞	.08
House	lb.	.08⅛	.08¼
Bone Naphtha	lb.	—	.08⅛
Herring, coast tanks	gal.	.45	.47
Horse, bbls.	lb.	.09½	.10
Lard, city, tierces	lb.	.12	—
Compound, tierces	lb.	.12¼	.12½
Middle Western, tierces	lb.	—	.12¼
Neutral, tierces	lb.	—	.14
Prime Western, tierces	lb.	.12½	—
Lard oil, No. 1, bbls.	lb.	.13	—
No. 2, bbls	lb.	.12¾	—
Extra, bbls.	lb.	.13½	—
No. 1, bbls.	lb.	.13¼	—
Winter strained, bbls.	lb.	.13¾	—
Prime, bbls.	lb.	.15½	—
Linseed Oil, boiled, taks	lb.	.0970	—
Car lots, bbls.	lb.	.1050	—
Less car lots, bbls.	lb.	.1090	—
Less than 5 bbls.	lb.	.1130	—
Double boiled, less than five bbls.	lb.	.1160	.1170
Raw, tanks	lb.	.0930	—
Car lots, bbls.	lb.	.1010	—
Less car lots, bbls.	lb.	.1050	—
Less than 5 bbls.	lb.	.1090	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1080	.1130
Varnish grades, bbls.	lb.	.1100	.1140
Linseed cake, bags	ton	47.00	48.00
Meal, bags	ton	57.00	—
Menhaden, crude, tanks, Baltimore	gal.	—	Nom.
Light pressed, bbls.	gal.	.71	.73
Yellow bleached, bbls.	gal.	.73	.75
White bleached, bbls.	gal.	.76	.78
Mustard, bbls.	gal.	.90	—
Neatsfoot, cold pressed, bbls.	lb.	.19	—
Extra, bbls.	lb.	.13½	—
No. 1, bbls.	lb.	.13¼	—
Pure, bbls.	lb.	.15	—
Oleo, No. 1, bbls.	lb.	.11½	—
No. 2, bbls.	lb.	.11	—
No. 3, bbls.	lb.	.10½	—
Olive, denatured, bbls., N. Y.	gal.	1.35	1.40
Shipments	gal.	1.25	1.27
Foots, bbls.	lb.	.10½	.11
Shipments	lb.	.10¼	.10½
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, casks spot	lb.	.09	.09¼
Shipments	lb.	.08¼	—
Niger, casks, spot	lb.	.08¼	—
Shipments	lb.	.07¾	—
Palm Kernel, pkgs.	lb.	.08¾	.09
Tank cars	lb.	.07¾	.07⅞
Peanut, crude bbls.	lb.	.12	—
Mills, tanks	lb.	.10¼	—
Refined, bbls.	lb.	.13½	—
Perilla, bbls.	lb.	.14½	Nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.05	1.07
Refined, bbls.	lb.	.86	.87
Red Oil, distilled, bbls.	lb.	.11	.11½
Tanks	lb.	.10¼	—
Saponified, bbls.	lb.	.11	.11½
Tanks	lb.	.10¼	—
Salmon, coast, tanks	gal.	.42½	.45
Sardine, coast, tanks	gal.	.47½	.50
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.12¼	.12½
Orient, coast tanks	lb.	.09¾	.10
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.86
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.16½	.17
Triple pressed, bags	lb.	.18	.18½
Stearine oleo, bbls.	lb.	.11¼	.11½
Tallow, edible, bbls.	lb.	.09⅜	.09⅝
City extra, works, loose	lb.	.08½	—
Special, works, loose	lb.	.08¼	—
Tallow oil, acidless, bbls.	lb.	.11¾	—
Tanks, N. Y.	lb.	.11½	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Oleomargarine Amendment

(*From Page 23*)

which are used in oleomargarine, namely, the milk or cream in which oleomargarine compounds are mixed and emulsified, are "cooking compounds" and not oleomargarine.

Definition of Product Denied

IT was testified to before the Committee that one reason for these court decisions was that at the beginning of the development of this industry an official of the Bureau of Internal Revenue issued a permit for the manufacturer to make and sell without designating his products as oleomargarine. That ruling appears in the printed record of the hearings, and it is disclosed that this permit was coupled with certain restrictions relative to the methods of handling and sale; that is, that the product could be made and sold as a "cooking compound" as long as it was kept in distinctive packages, and its sale kept free from any efforts to make it a substitute for or in place of butter or oleomargarine.

Finding later that these considerations were not being observed, the Bureau of Internal Revenue sought to have the products declared to be oleomargarine within the meaning of the present law, but up to this time has been defeated in the courts both in equity actions upon injunction proceedings directed against the enforcement of the law as to these products, and in direct test cases of seizure for nonpayment of taxes.

Margarine Statistics

According to data collected at the 1927 biennial census of manufactures, establishments engaged primarily in the manufacture of oleomargarin and other butter substitutes reported products valued at $39,282,364, a decrease of 1.4 percent as compared with $39,856,034 reported for 1925, the last preceding census year. For the purposes of this report, all these products are covered by the single designation "oleomargarin." The total production of oleomargarin in the United States in 1927 was 293,455,016 pounds, valued at $51,688,564, of which 180,103,026 pounds, valued at $33,024,819, was made in establishments engaged primarily in the manufacture of this product: 86,651,746 pounds, valued at $14,501,799, was made in the slaughtering and meat-packing industry, and 26,700,244 pounds, valued at $4,161,946, was made as a secondary product of other industries.

This industry embraces establishments engaged primarily in the manufacture of the commodities known as "oleomargarin," "butterine," "nut margarin," "nut butter," etc. The materials used in their manufacture comprise both animal and vegetable substances, such as coconut oil, peanut oil, oleo oil, milk, butter, etc.

Of the 36 establishments reporting for 1927, 6 were located in California, 5 in Illinois, 4 in Rhode Island, 3 in Maryland, 3 in New Jersey, 3 in Ohio, 2 in Missouri, 2 in Wisconsin, and 1 each in Florida, Indiana, Kansas, Louisiana, Massachusetts, Tennessee, Texas and Washington. In 1925 the industry was represented by 38 establishments, the decrease to 36 in 1927 being the net result of a loss of 7 establishments and a gain of 5. Of the 7 establishments lost, 4 went out of business prior to 1927, 1 was idle throughout the year, and 2 reported commodities other than butter substitutes as their principal products and were therefore transferred to the appropriate industries. Of the 5 establishments gained, 1 had manufactured commodities other than butter substitutes as its chief products in 1925 and 4 reported for the first time at the present census.

Shortening and Oil Output

According to data collected at the 1927 biennial census of manufactures, establishments engaged primarily in the manufacture of lard substitutes, cooking fats and vegetable cooking oils reported products valued at $148,468,076. The total production of lard substitutes and cooking fats in 1927 was 1,239,046,167 pounds, valued at $142,571,286, of which amount 775,006,564 pounds, valued at $89,319,769, was made in establishments engaged primarily in the manufacture of these products; 438,036,969 pounds, valued at $50,331,376, was made in the slaughtering and meat-packing industry, and 26,002,634 pounds, valued at $2,920,139, was made as secondary products of other industries. The total production of vegetable cooking oils in 1927 was 515,615,999 pounds, valued at $50,134,530, of which amount 468,224,705 pounds, valued at $45,561,305, was made in the lard substitutes, cooking fats and vegetable cooking oils industry, and 47,391,294 pounds, valued at $4,573,225, was made as secondary products in other industries.

The establishments classified in this industry are engaged primarily in the manufacture of lard substitutes, cooking fats and vegetable cooking oils from animal and vegetable fats and oils.

OIL & FAT INDUSTRIES

The Editor's Page

Anniversary

WE MORTALS are prone to gauge life by yardsticks, and by milestones. The yardstick of time is the year and its milestone may be said to be the decade. As at the end of each year we are given to review the year's accomplishments, so at the close of a decade, we are so much more liable to pause for a summary, to determine whether our struggles and efforts for progress have borne fruit during the period, or merely thistles.

This year marks the close of the second decade of existence of the American Oil Chemists' Society, and the members are invited to pause a while and consider whether the Society has meant progress in their professions for them, individually, for the industries which give them employment, for chemistry in general, and for oil chemistry in particular.

When, twenty years ago, a little group of chemists associated with the cottonseed oil industry met to found the Society, the science of chemistry, as applied to the oils and fats, was little known and less practiced in this country. There were a few chemists working on the problems of refining oils for edible purposes, and some of the very largest of American soapmakers had laboratory control of a sort for their factories. The constitution and structure of fats was little understood, however, and the composition of the various individual natural oils was clouded by many conjectures. Methods of analysis were those preferred by each chemist using them, and agreement of results between laboratories was a matter of fortuitous chance, rather than of certainty. Methods in factory work were less certain, even, than those of the laboratory. Manufacturers thought they possessed secrets from their competitors and taught their chemists and other employees to be chary of discussion.

Despite these conditions, a small number of forward-looking chemists had the courage to found their society for mutual interchange of ideas, and from this limited beginning the American Oil Chemists' Society has steadily progressed and has grown to be a most important factor in the industries which employ oils and fats in their manufacturing processes. To review only a few of the accomplishments of the Society: The Smalley Foundation has placed the methods of analysis for oil and ammonia in feedstuffs and fertilizers on the basis of better than 99.95 percent accuracy as between laboratories. This has been accomplished by many years of earnest cooperation in analytical work. The color reading of oils and fats has been standardized by careful investigation, with the splendid cooperation of the U. S. Bureau of Standards. The composition and uses of many fats, old and new to our knowledge, have been studied by the laboratories of the U. S. Department of Agriculture, and by others among the Society's members, and the findings published in the Official Journal of the Society. The Society has published its complete standardized methods for fat and oil analysis (prepared in collaboration with the American Chemical Society).

The advances in the technology of oils and fats in this country during the past twenty years have been great indeed and in practically every case have been developed by members of the Society. This Society deserves the support of every chemist and every manufacturer who is interested in the chemistry and technology of oils and fats.

Food Fat Containers

ALTHOUGH there has been considerable progress in packaging fatty food products, along with other foodstuffs, during the past ten years or so, much that is desirable from the angle of preservation and sanitation, and in distribution and sales can still be done. As with innumerable other foodstuffs, the great part of development attention which cooking fats, shortening fats, salad oils, margarin, butter, lard and other products of like nature have received during recent years, has been devoted to improving and perfecting the product itself. There have been some notable exceptions, but on the whole, the container, the can, pail, carton, jar or bottle, and its closure have not received attention in proportion to their importance.

In some classes of foodstuffs, none is sold unpackaged. In other classes, the march of package progress is steadily eliminating the sale of bulk goods in retail channels. There is no need to go over and over the advantages of the packaged article. Take the case of lard and

compare the open tub in the grocery store with the cartoned product or with the sealed can free from contamination and retaining all original characteristics of color and flavor. The same comparison holds throughout the entire list.

The consumer likes to receive foodstuffs above all other products in the most attractive form. Appearance is either a tremendous asset in sales or it is a distinct liability. An attractive can or pail, clean-looking, which reveals the product in its original snowy whiteness when opened, is demanded. Bad looking containers are being replaced and improved. Closures are being improved. They must seal and reseal with the minimum of effort. Trick closures, closures with sharp cutting edges, leaky closures, pouring spouts which spill—they too are being eliminated.

Among the packagers of fatty food products, a few have adopted the most modern refinements. The majority however, are still far in the rear in the parade of packages. To this subject, a lot more thought will have to be given over the next year or two by those who would keep their products up in the front line in retail competition. In this issue of *Oil & Fat Industries*, there is a discussion of lard packaging which is well worth reading for it bears on a subject which has become vitally important in the present day sale of foodstuffs through retail channels.

Fellowships for Oil Mill Students

For the purpose of furthering scientific study in cotton oil milling, graduate work is offered by the Department of Chemistry and Chemical Engineering of the Texas Agricultural and Mechanical College. At a recent meeting in Memphis, Tennessee, the executive committee of the Interstate Cotton Seed Crushers' Association granted to the A. & M. College of Texas, two graduate fellowships. J. Campbell Jones of the Abilene Cotton Oil Company, Abilene, Texas, also granted one and S. W. Wilbor, of the Southland Cotton Oil Company, Paris, Texas, granted one.

Industrial Donates Golf Trophy

The Golf Tournament Committee of the American Oil Chemist's Society announces the donation of a beautiful Challenge Trophy, in the form of a 31 inch silver loving cup, by the Industrial Chemical Sales Company, of New York and Chicago. The cup will be awarded to the winner of the 1929 annual golf tournament, to be held at the time of the New Orleans convention, May 13th and 14th, and will be presented with appropriate ceremonies by President Putland at the annual banquet on May 14th. The name of the winner and the year will be engraved upon the cup, which will be held as the champion's property until the 1930 tournament, when it will become the property of the new champion whose name will be engraved upon it also. Any member winning the cup three times (not necessarily consecutively) will become the permanent possessor of this beautiful trophy.

American Oil Chemists' Society golf championship challenge trophy cup to be competed for the first time at New Orleans May 13th and 14th

American Oil Chemists' Society Convention

Twentieth Anniversary Sessions Will Be Held in New Orleans, May 13th and 14th

THE American Oil Chemists' Society is preparing this year to fittingly celebrate the twentieth anniversary of the Society with a splendid program at the Annual Convention, which will be held in New Orleans on Monday and Tuesday, May 13th and 14th. The little group of chemists who established the Society in 1909 can look with pride upon the result of the first twenty years' growth. The Society now numbers among its members more than three hundred chemists and engineers whose chosen fields of endeavor are in the production of all varieties of fats, oils, soaps, and products and by-products thereof. The growth of the Society has been steady and constant. In the beginning the interests of the members were chiefly in cottonseed oil and its products, but today all classes of fatty oils and products are represented in the membership, from mayonnaise and salad oil to stearic acid and candles. The last two years have seen marked progress, the first of them in the inauguration of a series of Fall Meetings, held during the Autumn in a Northern city, to supplement the Annual Meeting, which is always held in the South in the Spring, and the year just past, under the able Presidency of A. W. Putland, for the establishment of the Soap Chemists' Section of the Society, in which Section the particular problems of the soap chemists will have consideration, whether or not they are problems dealing primarily with oils and fats: the soapmaker's raw materials and the major interest of the Society as a whole.

The Smalley Foundation, for the promotion of accuracy in analyses of feeding stuffs for oil, ammonia and moisture, has closed its most successful year since its establishment, with a greater number of laboratories, members of the American Oil Chemists' Society and others, collaborating in cooperative analytical work. The Society has published its Standard Methods of Analysis, in convenient form for the use of chemists. The Methods as published are arranged in loose-leaf form in a Lefax binder, so that additions may be made most conveniently, when necessary.

Roosevelt Hotel, New Orleans, convention headquarters for the 20th Annual Meeting of the American Oil Chemists Society

The complete program of the meetings follows:

Monday, May 13, 1929

Convention called to order at 9:30 A. M.
E. G. Williams, Chairman
Local Arrangements Committee
Invocation
Opening of Twentieth Annual Meeting
Greetings from the Society's First President
Felix Paquin
Reading of Minutes of Last Annual Meeting
J. C. P. Helm
Address of President
A. W. Putland
Report of Secretary-Treasurer
J. C. P. Helm
Report of Governing Committee
J. C. P. Helm, Secretary

Report of Membership Committee
W. R. Stryker, Chairman

Report of Sampling Committee
W. G. McLeod

Studies on Gossypol—A Progress Report
E. P. Clark
Interstate Cottonseed Crushers' Assn., Research Associate

Report of Cottonseed Analysis Committee
C. H. Cox, Chairman

A Preliminary Report on the Study of Methods for Cottonseed Analysis
G. S. Jamieson and R. S. McKinney

(This report is from the U. S. Department of Agriculture's Committee on Methods of Sampling and Analyzing Cottonseed for Crushing)

Report of Color Committee
W. D. Hutchins, Chairman

Report of Refining Committee
C. B. Cluff, Chairman

Report of Special Committee on Color Readings
W. D. Richardson

At this period there will be a general discussion on Methods with the Chemists' Committee of the Interstate Cottonseed Crushers' Assn.
T. C. Law, Chairman

Appointment of Special Committees

Announcements

Adjournment until 9:30 A. M. Tuesday

Tuesday, May 14, 1929

Report of Soap Section
A. K. Church, Chairman

The Cooperative Work of the A. and M. College of Texas with the Cottonseed Oil Mill Industry
C. C. Hedges
Head of Department of Chemistry and Chemical Engineering

Report of Kreis Test Committee
A. S. Richardson, Chairman

Report of Committee on the Effect of Crude Mill Operations on Crude Oil Produced
A. K. Schwartz, Chairman

Report of Fat Analysis Committee
W. D. Richardson, Chairman

Report of Moisture Committee
W. H. Irwin

Palm Oil from the Belgian Congo
George S. Jamieson & Robert S. McKinney

Referee Board Report
W. H. Irwin, Chairman

Report of Olive Oil Committee
Louis M. Roeg, Chairman

Report of Special Committee on Method for Determining Free Fatty Acid in Refined Oils
M. M. Durkee, Chairman

Report of Detergents Committee
L. T. Howells, Chairman

Report of Smalley Foundation
H. C. Moore, Chairman

Report of Committee on Publication of Methods
W. H. Irwin

Report of Planning and Uniform Methods Committee
J. J. Vollertsen

The Annual Banquet will be held on Tuesday evening and there will be a golf tournament during the two days of the convention with many handsome prizes, including a beautiful challenge cup presented to the Society by The Industrial Chemical Sales Company. The cup is illustrated elsewhere in this issue of *Oil & Fat Industries*. All members and all who are interested in the chemistry of oils, fats and soaps are urged to attend this 20th Anniversary Convention at New Orleans, May 13th and 14th. Headquarters will be at the Roosevelt Hotel, where the Society has held many previous enjoyable meetings.

Report of the Referee Board

The Referee Board considered eight new applications during the past year and of the eight the following were granted certificates:

Fred C. Schilling, Limited Referee Certificate

A. H. Preston, Limited Referee Certificate

W. J. Bramblett, Limited Referee Certificate

Herbert M. Shilstone, Limited Referee Certificate

Edgar H. Tenent, Limited Referee Certificate

D. B. Dickson, Limited Referee Certificate

H. P. Trevithick, Full Referee Certificate

We also have under consideration at the present time the application of one other Laboratory.

The Referee Board decided, in order to get a better line on the work of the Referee Laboratories, to send out some check samples and a sample of crude oil and refined oil was sent to each laboratory. The results in some instances indicated that certain Referee Laboratories were not as familiar with the Rules as they should be and in some instances the results obtained were unsatisfactory. In each instance where there were discrepancies the

Referee Board has taken the matter up with the Laboratory in question and expects to have the matter settled to their satisfaction before granting certificates for the season 1929-1930.

The present Referee Board recommends a continuance of this check at regular intervals by the incoming Board.

W. H. IRWIN, *Chairman*

Report of the Refining Committee

The Committee has studied the refining of Expeller Oil, Corn Oil, Soya Bean Oil and Peanut Oil to determine the effect of each variable in our refining test, and to determine the proper amount of caustic and strength of lye. The effect of different brands of filter paper on the color was also investigated.

The experimental work for the Committee was done in the laboratory of The Procter & Gamble Company by an investigator, at the expense of the American Oil Chemists' Society. After we had determined what appeared to be the best conditions, a co-operative sample of each oil was sent to the members of the Refining Committee for co-operative tests. With further reference to color readings, some consideration was given to the number of glasses to be used in matching colors.

As a result of the year's work, we make the following recommendations:

(1) *Expeller Oil*—No change should be made in the present official method as now written.

(2) *Corn Oil*—To add to our present methods of analysis the following. Note that we consider this a tentative method rather than an official method at this time.

Tentative Method for Refining Corn Oil

The apparatus and general procedure shall be exactly as prescribed for hydraulic pressed crude cottonseed oil, with the following exceptions: The choice of lye shall be a concentration of 16° in all cases. Two refining tests shall always be made, using respectively ½ and ⅔ of the maximum amount of caustic soda permitted for hydraulic crude cottonseed oil having the same F. F. A. The soap stock may be hardened by chilling in ice water, if necessary, to permit draining the oil from the soap stock.

(3) *Soya Bean Oil*—We recommend the following as a tentative method.

Tentative Method for Refining Soya Bean Oil

The apparatus and general procedure shall be the same as prescribed for hydraulic pressed crude cottonseed oil, with the following exceptions: Choice of lye shall be 14° in all cases, and two tests shall be made using respectively ½ and ⅔ of the maximum amount permitted for hydraulic crude cottonseed oil having the same F.F.A. The soap stock may be hardened by chilling in ice water, if necessary, to permit draining the oil from the soap stock.

(4) *Color Glasses*—We recommend that three glasses be required for use in all color readings, one colorless glass to be used as the third glass when only one yellow and one red are needed.

(5) We recommend that the plan of having an investigator be continued for the work of the Refining Committee, and we also recommend it to the Society for the work of other committees, where a similar study of variable conditions is to be made, as we consider it the quickest and surest way to obtain results.

(6) For next year's committee we recommend the following:

(a) Complete the work on Peanut Oil.

(b) Investigate the refining of Coconut Oil.

(c) Investigate the effect of different filter papers and other conditions in the filtering of refined oils with regard to the effect of these conditions on the color.

C. B. CLUFF, *Chairman*

Oils and Fats Situation in Europe

Improved processes of refining which have added to the number of oils which can be used as food are responsible, the March issue of the Bank of America Review says, for the decided increase in the consumption of vegetable oils in most European countries. Imports of cottonseed into the United Kingdom between 1919 and 1928 increased from 462,000 to 575,000 gross tons. Between 1922 and 1927 French imports of cottonseed oil increased from about 2,000 to 4,000 metric tons. "These evidences of the growing use of vegetable oils and of the recovery of domestic pork industries," the review concludes, "seem to indicate that American lard cannot be exported in large quantities except when hog prices are low. In the domestic field as well as the foreign, lard and other pork products encounter a certain amount of competition from vegetable oil products and lard substitutes. Many lard manufacturers here feel that the best way to meet this competition of substitutes is better standardization of product, and a careful study of causes of deterioration."

Oil Chemists' Official Committee Reports

Full Texts of Findings of Many Committees to be Presented at the Annual Convention, May 13 and 14

Report of F. F. A. Committee

DURING recent years there have been but few cases where buyer's and seller's chemists have not agreed on the free fatty acid content of crude oils. And so it was felt that the method of analysis for free fatty acid of crude oils described in Sec. 4, Rule 272, was giving satisfaction, and needed no investigation. In the case of refined oils there have been many differences over the free fatty acid content. The nature of the complaints have been such as to indicate that the method as written under Rule 274, Section 4, does not yield results of sufficient accuracy on refined oils of low acidity. So the work of the committee confined itself to finding the cause of the discrepancies, and to evolving a method which should so specify the minute details of the simple titration as to yield results reproducible on the same oil in different laboratories.

At the start, the opinions of the committee members were compiled for the information of all on the committee. It was found that the committee members did not agree on the details, and so a method was drafted which would clarify some of the details of the published method, and not conflict with the assembled opinions of the individual committee members. Four check samples were first sent out by the members to each other; a sample of refined cottonseed oil, two samples of refined corn oil from different makers, and a sample of P.S.Y. cottonseed. No other freshly refined vegetable oils seemed to be readily available. The results on the check samples, and an independent investigation of some of the details, brought out the following points:—

(1) Results are as accurate with tenth normal sodium hydroxide as with twentieth normal.

(2) A sample of 56.4 grams gives a slightly lower result than a sample of 28.4 grams, indicating that not only is the percentage effect of any contaminants reduced, but also the effect of the variation in color at start and finish of the titration is lessened.

In this connection it was found that where the same stopper and flask is used repeatedly without cleaning, that the few drops of oil remaining in the flask sets off the pink color by identical backgrounds at the start and finish of the titration.

(3) It makes no difference whether an Erlenmeyer flask or four ounce bottle be used in the titration except that a four ounce bottle is a bit small for a sample as large as 56.4 grams.

(4) Though it is usually more convenient to pipette a sample, the rules should specify a weighed sample for the sake of accuracy.

(5) Investigation disclosed the fact that an ordinary cork itself when cut in small pieces and digested in hot formula 30 alcohol will require some alkali for neutralization, doubtless due to the presence of a slight amount of resins. For that reason either a rubber stopper or a cork that has been seasoned should be used where great accuracy is desired.

(6) Hot titration is much better than cold titration. The temperature of the water bath must be below the boiling point of the alcohol. For that reason the temperature of the water bath in which the flask is warmed should be about 60° to 65° C. When the titration is made hot the time for the settling of the oil is reduced, and a more definite determination of the first appearance of a permanent pink color is obtained to match the pink tint existing at the start of the titration.

* * *

The method was then modified as given later in the report in accordance with the above points, and another check sample of salad oil was distributed to the committee members for titration. The results were as follows:

SAMPLE NO. 5

Trial	Result	Member
1	.030	W. H. D.
2	.032	"
3	.030	"
4	.034	"
1	.0312	J. D. E.
1	.030	R. C. H.
2	.0275	"
3	.025	"
4	.025	"
5	.020	"
6	.030	"
1	.0275	R. U. N.
2	.0250	"
3	.0257	"

1	.019	M. M. D. and G. W. F.
2	.020	"
3	.020	"
4	.020	"
5	.022	"
6	.022	"
7	.024	"

Grand Average:—.0257%
Greatest Variation from Average:— .0083%

The greatest variation from the average result was less than .01%. Two of the members obtained checks within .0001% of each other.

In order to make a further test of the method four different samples were made up using fresh corn salad oil and enough olive oil elaine of about 95% oleic acid content to slightly alter the free fatty acid. The samples were filled into four ounce bottles and marked A, B, C, D, E, F, G, and H. The analyst making the titration by the tentative method had no idea as to which two, if any, were duplicates.

The results were as follows:

Duplicates				Error
A	.018%;	G	.015%	.003%
B	.022%;	F	.023%	.001%
C	.022%;	H	.020%	.002%
D	.069%;	E	.066%	.003%
		Average Error		.002%
		Maximum Error		.003%

Apparently the method of titration will give results reproducible to within a few thousandths of one percent, which should be close enough for all practical purposes.

It is recommended by your committee that the official method for the determination of free fatty acid in refined oils be altered to read substantially as follows:

"Put about 50 ml. of alcohol (Formula 30) into a clean dry 150 ml. flask and add a few drops of refined oil. Add 2 ml. of 1% phenolphthalein solution and place in water at 60 to 65° C until warm, and titrate with O.1N NaOH solution shaking vigorously until a faint permanent pink color is obtained. Weigh 56.4 gm. of the refined oil into the neutralized alcohol and titrate with occasional warming and violent shaking of the mixture until a faint permanent pink color is obtained in the supernatant alcohol of the same intensity as before adding the oil. Multiply the number of ml of O.1N NaOH by 0.05 and report as percentage free fatty acid expressed as oleic."

M. M. DURKEE, *Chairman*
R. U. NORRIS
W. H. DICKHART
J. D. EVANS
R. C. HATTER

Moisture Committee Report

The Moisture Committee this year did not send out any cooperative samples. The oven and method recommended by the Moisture Committee were adopted last year by the American Oil Chemists' Society but through an oversight the method and oven were not referred to the Chemists' Committee of the Cottonseed Crushers' Association and therefore it was not compulsory for various laboratories to use the oven during the past season. There were, however, some laboratories which purchased the oven and used it but unfortunately specifications as furnished by the Moisture Committee were not strictly adhered to and in some instances the ovens furnished certain laboratories leaked and were unsatisfactory. This was due principally to two things; first, the specification as to the weight of metal to be used was not followed, and second, the seams were not brazed. The Committee took these matters up with the manufacturers and we now have assurance that these ovens in the future will be brazed and will be absolutely guaranteed against leaks. The manufacturers claim, however, that it will be necessary to increase the price $25.

Although the Committee did not send out any cooperative samples, the Chairman was furnished with the numbers of three laboratories which handled the Smalley check meal samples in these ovens. The tabulation given below shows the results obtained.

	COLLABORATOR		
Sample	No. 1	No. 2	No. 52
1.	7.87	7.91	7.85
2.	9.35	——	——
3.	8.80	——	8.63
4.	8.20	——	7.91
5.	8.55	——	8.47
6.	8.31	8.09	7.62
7.	7.91	7.90	8.33
8.	7.42	7.63	7.68
9.	6.79	6.74	6.61
10.	7.14	6.90	6.93
11.	6.61	6.68	6.59
12.	6.84	6.64	6.45
13.	6.80	6.78	6.50
14.	6.35	6.38	6.28
15.	6.24	6.20	——
16.	6.32	6.32	6.38
17.	6.31	6.24	6.16
18.	6.05	6.06	6.07
19.	5.60	5.86	6.21
20.	6.05	6.10	6.35
21.	6.05	6.18	6.65
22.	6.56	6.52	7.31
23.	5.58	6.18	5.89
24.	6.01	6.04	6.02
25.	6.14	6.26	6.30
26.	6.82	6.59	6.87
27.	6.28	6.24	6.41
28.	6.41	6.30	6.36
29.	6.11	6.40	6.30
30.	6.90	6.40	6.74

These results are remarkably close in the opinion of the Committee and further confirm the value of this oven and method in obtaining uniform results. Next year the Committee hopes to have more data to present because the method and oven have been approved by the Chemists' Committee and many more laboratories will doubtless be equipped with this oven.

W. H. IRWIN, *Chairman*

Report of Seed Analysis Committee

A large amount of work has been done by the Members of this Committee in an effort to find whether the results obtained by the present Official Method were true indications of the value of the seed. However, this work has not been carried to a point where any definite proposal to change the Method or substitute another can be made. There are two points, however, where the Committee feels that correction in the present method of calculating the yields should be made.

FIRST: A correction of about two-tenths of one percent or four pounds of oil should be deducted from the total oil shown to take care of the oil left in the hulls.

SECOND: A uniform basis should be adopted upon which all seed should be calculated where the foreign matter determination has not been made due either to a small sample or because it has not been requested. This basis should be clearly shown on the report.

Shortly after our work was started the Department of Agriculture appointed a Committee to investigate the whole question of cottonseed sampling, grading and analysis, and it was the unanimous opinion of our Committee that we could best serve the Industry by turning over all our results to this Department of Agriculture Committee and offering them our fullest cooperation in every way. This has been done and should the Society wish to continue the Committee or appoint a new one we feel that the Members will always be ready to try out any suggested improvements in the present method or any new method that may lead to a better evaluation of cottonseed.

C. H. Cox, *Chairman*

April 22, 1929.

Report of Methods Committee

The work of rewriting the methods was begun last year by a Committee of which Mr. Cluff was Chairman, but owing to Mr. Cluff's illness he asked the writer to undertake the rewriting and publication of the methods. This work has been completed and the methods have been published in loose leaf form by the Lefax Company, at an approximate expense to the Society of $760 for 2,500 sets of methods and 100 leather binders. The methods as published are strictly chemical and physical methods and contain no references to the Rules of The Cottonseed Crushers' Association. In addition to the methods printed in the Chemists' Chapter of the Rules of The Cottonseed Crushers' Association, the methods as published contain all of the methods of the Fat Analysis Committee of the American Oil Chemists' Society and the American Chemical Society revised to January 1, 1929.

These methods may be obtained in pamphlet form through the Secretary of The Society for 50 cents each or may be obtained in a leather back loose leaf binder of convenient size for $1.50. We have also made arrangements with the Lefax Company so that in the future will print 2,500 single sheets at a cost of $15.25 for straight printed matter or $19.75 for tabular matter. This will enable The Society to keep the methods up to date, insert new methods, etc., at a very small cost. The Committee wishes to urge upon each member of The Society that he purchase at least one or more of these sets.

W. H. IRWIN, *Chairman*

Schwartz Laboratories, Inc., Chemists and Engineers, announce the removal of their offices and laboratories from 113 Hudson Street to 202 East 44th Street, New York City.

The Industrial Chemical Sales Company, manufacturers of Nuchar, announce the issue of a new booklet dealing with the application of activated carbons to the refining and bleaching of vegetable oils, fats and greases. They will gladly mail a copy of the booklet to anyone interested. Their address is 230 Park Avenue, New York City.

The Supreme Court of Georgia has ruled that the state chemist cannot give a certificate of an analysis of a fertilizer sample for use as evidence in a court, unless that sample actually has been taken from the fertilizer at issue by a qualified state inspector. The decision was in a case of the Southern Cotton Oil Co. against T. B. Raines, appealed from a district superior court.

The New York Burlap & Jute Exchange, organized recently to provide an exchange trading in future contracts in burlaps, jute and other fibres is reported to be nearly ready for its official opening.

The Packaging of Lard and Shortenings

Increasing Demand for More Attractive Containers Stimulates Study of Packaging Methods and Problems

By Alan Lee Porter

LARD and other solid fat shortening and cooking products have been used by inhabitants of the temperate climate zones throughout the history of mankind, but it is only within comparatively recent times that problems of distribution have stimulated the development of containers for such products. The earliest primitive man had no domestic animals and was of course entirely dependent upon the chase for what meat he procured. As he gradually acquired knowledge of fire and its value to him, he discovered the process of rendering or "trying out" the fatty portions of the animals he slew and so produced the first clear fats, free of animal tissues and of water. Such fats were undoubtedly the lard of wild boars and the tallow of bears, of deer or of other ruminants.

Among the people of such early periods the family and the nomadic tribe were the only units of population, so that the first containers for rendered fats were doubtless gourds, hollowed logs, or the dried globular tissues of the slain animals. Such fats were used by the nomadic tribes for basting their roasted meats and indeed as a direct item of their diet.

Discovery of Shortening

AS the human race progressed to the discovery of crop planting and harvests the life of mankind changed from one of wandering to one of settled abode, which fostered the development of grain crops and the discovery of metal recovery from ores. It was then inevitable that the value of fats would soon become apparent; as shortening in connection with breadstuffs, as an aid to frying in pans and as a lubricant for man's primitive mechanisms, such as sledge runners and hoisting beams. As various tribes and families developed needs and wants which they were unable to satisfy with their own produce, bartering with other groups, the first form of commerce, appeared, involving the need of containers for the products exchanged.

Decorated shortening pails in popular sizes. By American Can Co.

The wooden barrel, or keg, of various sizes, was one of the earliest packages devised by man for holding many different products and its use for fats and greases dates from the most remote periods of which we have records. Its first form was cylindrical, but this shape was soon almost entirely superseded by the bilged type, which retains all the advantages of the cylindrical, plus greatly added strength and ease of handling.

This package has remained for years in a predominant position for the shipment of lard and shortening, as well as for oils and many other liquids. The particular type used for lard and shortening is known as the tierce, with a capacity of between four hundred and five hundred pounds. It is generally built of number one clear white oak. Most shippers and buyers prefer the tierce unpainted, but with a coating of clear varnish on the exterior. The interior is generally given a lining coat of silicate of soda solution, which must be thoroughly dried before filling the package. It is also necessary to exercise care that the lard or shortening is not filled into the package at a temperature high enough to cause softening of the silicate lining.

Shippers of shortening use the wooden barrel in the tierce size described above and there also has been some demand for the keg and

A variety of present types of lard and shortening pails. By Continental Can Co.

half-barrel sizes, which are smaller replicas of the tierce, holding one hundred and two hundred pounds of product, respectively. In recent years the scarcity, particularly in the United States, of good oak suitable for the construction of wooden barrels has encouraged the development of metal packages as substitutes. Most such packages are used only for domestic shipments and are returned to the shipper for refilling, as their cost is too high for inclusion in the price of the lard or shortening and prohibitive ocean freights have restricted them to domestic use.

The first type of metal barrel to appear on the market was cylindrical in shape, of fairly heavy gauge metal and equipped with one or two bung-holes. To remove a solid fat from such a package it is necessary first to liquefy the contents with the aid of heat. This, of course, defeats the purposes of the baker and of most other users, who desire to take advantage of the peculiar consistence of lard and shortening in their work.

(Courtesy Republic Steel Package Co.)

New type open head one time shipper for bulk lard, shortenings, etc.

The next development in metal barrels consisted of the removable-head drum. This package is built in giant hydraulic presses, of heavy seamless steel, and is bilged in shape similiarly to the standard wooden barrel. The removable head is fastened in by one of two different methods, either a constricting hoop of steel secured by a threaded bolt or a series of lock nuts on the head, which nuts are secured under a ridge on the barrel by a quick turn. These packages are procurable in black steel, galvanized, or tin-coated. They are of

(Courtesy Pressed Steel Tank Co.)

Standard removable head seamless steel barrel

course returned when empty to the shipper for refilling. This removable-head seamless barrel is a very popular package at the present time, chiefly because of the ease with which it is emptied and cleaned.

A recently introduced package which bids fair to enjoy great favor with shippers and consumers of lard and shortening is a light steel removable-head one-time shipper. This newly perfected drum fills a long-felt need, in that it is light and inexpensive, but shares the advantages of the heavy removable-head barrel.

Tubs and Large Pails

THE next class of packages used by the lard and shortening distributors comprises both wooden and metal containers in sizes of forty, fifty and sixty pounds capacity. These types of package are popular with retailers,

(Courtesy Mechanical Mfg. Co.)

Lard carton filling machine

who display them in their refrigerators and dispense the products in bulk to their customers. The wooden tubs are made of several kinds of wood, poplar, ash and oak being popular, with hoops of steel or of wood, the latter type being classified as butter tubs.

The tubs are often lined with vegetable parchment paper before filling, to prevent discoloration of the product by the wood or the absorption of any odor from it. Before application of the cover a circle of the vegetable parchment paper is laid over the lard or shortening in the tub. A large type of standard steel pail is becoming popular in these sizes, because of ease of handling and freedom from odors foreign to the contained product. Such pails are generally tin-coated for use in carrying lards and shortenings.

Retail Packages

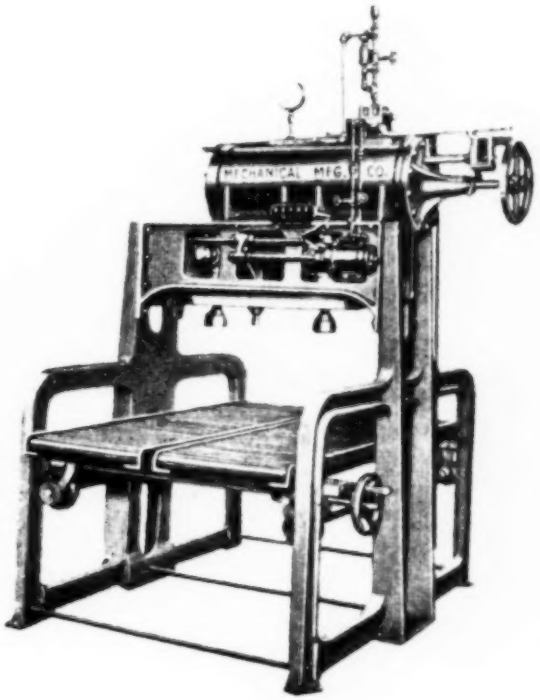
WE are living in an age of packaged goods. By continuous and tireless advertising campaigns, manufacturers of all varieties of foodstuffs and other commodities have educated the housewife of today to purchase all her needs for the home in unbroken trademarked packages, so that she may know the grade and quality of her purchases. In the lard and shortening field this tendency has promoted the development of the one to twenty pound size metal pails and the one pound carton.

The metal pails are formed from light steel sheets which are tinned on both sides and generally japanned on the exterior of the can with the manufacturer's characteristic trademark design emblazoned on the front. The containers are often lacquered inside and out and are equipped with tight-fitting slip-covers. Such cans are filled in the one, two, three, four, five, ten and twenty pound sizes and in the fifty pound size for the hotel and restaurant trade. For further protection of the contents in summer or for tropical shipments, these pails are provided with tight-fitting crimped covers of tinned light sheet steel, which fit on top of the pail beneath the slip cover and which are known as summer covers.

In the earlier days of the tinned lard pail, it was always made of a shape which tapers toward the bottom, to facilitate nesting the pails for shipment to the lard manufacturer and this shape is still very popular. In recent years, however, many manufacturers have abandoned the tapering pail for a full cylindrical shape, because of the greater trademark display space of the latter, and many packages of most attractive appearances have been designed.

The demand for a small size retail package of pure lard at an attractive price has resulted in the appearance of the one pound carton, similar in size and shape to the standard pound print of butter. These cartons are made of paraffined cardboard, and printed with the

(Continued on Page 43)



(Courtesy Mechanical Mfg. Co.)

Machine for filling lard in tubs or export boxes

Report of the Smalley Foundation Committee

Cooperative Meal Samples for the Season 1928-1929

By H. C. Moore, *Chairman*

THE following five tables give a summary of the results of cooperative analytical work of the Smalley Foundation for oil and ammonia for the past year. The work was concluded with sample No. 33, reported on April 17, 1929. The number of collaborators participating this year is 102, as compared to 75, 78, 88 and 91 for the four preceding years.

In Table No. I is shown the standing of the 46 collaborators who reported oil determinations on all samples. In the previous year 42 reported on all samples, as compared to 43, 35, 29 and 36 respectively in the four preceding years. Table No. II shows the corresponding standing of the 74 collaborators who reported ammonia results on all samples. This number compares with 63, 65, 52 and 42 in the four preceding years. Table No. III gives the combined average standing for both oil and ammonia for the 46 collaborators who reported both oil and ammonia on all samples. In the previous year 42 collaborators reported oil and ammonia results on all samples, as compared to 43, 35, 29 and 36 respectively for the four preceding years. Table No. IV gives the summary of results of other collaborators who have failed to report on all samples, but whose results deserve recognition. Table No. V gives an idea of the range of agreement of results for oil and ammonia separately on the 30 samples. The best general agreement for oil is found in the case of sample No. 12, and for ammonia on sample No. 6; the poorest agreement for oil is in the case of sample No. 27, and for ammonia on sample No. 13. This table shows the maximum, minimum and average number of collaborators in the case of oil and ammonia within the three ranges chosen for all samples.

The awards for the best work on the thirty samples are the same as for several seasons past, and as published in the Cotton Oil Press in 1923. The prize winners are as follows:

The Battle cup for the highest efficiency in the determination of both oil and ammonia is awarded to No. 85, Geo. W. Gooch Laboratories, Los Angeles, California, whose average is 99.874 per cent. The certificate for second place goes to No. 21, Dr. W. F. Hand, State Chemist of Mississippi, whose average efficiency is 99.848 per cent. The corresponding percentages for the two previous years were 99.934 and 99.899½, 99.919½ and 99.901 per cent, respectively. The collaborators will recall that the present cup was generously furnished by Dr. H. B. Battle of Montgomery, after he had been awarded permanently the original cup, having won it on three different occasions. This year is the third award of this cup. It was awarded to Dr. W. F. Hand, State Chemist, A. & M. College, Mississippi, in 1926-27; to Mr. E. H. Tenent, International Sugar Feed Co., Memphis, Tenn., in 1927-28.

The certificate for the highest efficiency in the determination of oil is awarded to No. 85, Geo. W. Gooch Laboratories, Los Angeles, whose average is 99.839 per cent, and the certificate for second place goes to No. 63, Mr. D. B. McIsaac, International Vegetable Oil Co., Savannah, whose average is 99.791 per cent. The corresponding percentages for the two previous years were 99.920 and 99.895, 99.878 and 99.852 per cent, respectively. The two certificates for the highest efficiency in the determination of ammonia are awarded to No. 5, Mr. R. D. Caldwell, Armour Fertilizer Works, Atlanta, Georgia, and No. 52, Southwestern Laboratories, Dallas, Texas, who are tied for first place, their average efficiency being 99.974 per cent. No. 48, Mr. George K. Redding, The Larrowe Milling Co., Rossford, Ohio, and No. 96, Mr. Landon C. Moore, Dallas, Texas, are tied for second place, their average efficiency being 99.965 per cent. The corresponding percentages for the two previous years were 99.970 and 99.965, 99.996 and 99.988 per cent. In accordance with the resolution adopted by the American Oil Chemists' Society, the identity of the other collaborators will not be disclosed. It will be observed from the foregoing that the percentage efficiency for ammonia determinations during the past year is very nearly as high as that for the previous year, but the efficiency for the oil results does not compare quite as favorably with those for the previous year.

The method for determining the standing of the various collaborators and their per cent efficiency is the same as has been used for several years past, and is fully described in the January, 1923, issue of the Cotton Oil Press, Vol. VI, No. 9, Page 33. The same rule

also has been used as heretofore in calculating the accepted averages, as follows:

All results are listed in an ascending order from the lowest to the highest and a preliminary average calculated after omitting results which are obviously extreme. Next, all results within plus or minus 0.10 per cent from the preliminary average are taken and a new average called "A" is calculated. In other words, if 7.50 is the preliminary average, then all results from 7.40 to 7.60 inclusive are taken. Next is found the largest number of results within the "A" group which are within a range of 0.10 per cent, (that is, say 7.40 to 7.50 inclusive, 7.41 to 7.51 inclusive, or 7.45 to 7.55 inclusive, etc.) and the results in this group used to calculate average "B." The accepted average is the average of "A" and "B" taken to the nearest 0.01. In case this calculated average should be exactly half way between two values 0.01 apart, then the "B" result is favored, that is, in case the "A" result is 7.500 and "B" 7.510 and the average of "A" and "B" 7.505, the average would be 7.51. In order that this report may be published in the May issue of *Oil & Fat Industries*, the chairman has been obliged to complete his calculations before receiving replies from the collaborators, giving their record of "points off" on all samples, and it is hoped that these tabulations are correct, but he will gladly acknowledge any errors which may appear.

There have been very few complaints from the collaborators regarding the samples during this past year, and the chairman feels sure that the committee, as well as all the collaborators, wish to thank Mr. Law for his painstaking work in the preparation and handling of the samples. Mr. Law, however, has requested that he be advised if there is any doubt as to the uniformity of the samples, and the chairman has passed on to him the few comments that have been received. An opportunity has been afforded all the collaborators to be advised by wire collect in case their reports are not received at the appointed time each week or in case there seems to be a typographical error in their reports. Only 51 have taken advantage of this offer. There have been one or two misunderstandings in this respect where collaborators have understood that they were marked to be wired in such cases, when no such request had been received by the chairman, and the chairman has been obliged under our rules to accept only such results as are received before the report goes to press, which includes Tuesday of each week. Results which have been received early Wednesday morning before the copy is sent to the printer have been accepted; however these results are not counted in making up the accepted average. It is, of course, possible that the number of results received after the average has been calculated might change this result as much as .01, although this condition would rarely occur.

This year's report of the Smalley Foundation shows considerable progress in the number of collaborators enrolled, even though the per cent efficiency is not quite as high as in the two preceding years, when an unusually high efficiency record was established. The value of the cooperative work is becoming more and more appreciated and enlisting the interest of an increasingly larger number of state, commercial and works laboratories, including in the latter those of the oil, fertilizer and milling industries. The chairman wishes to remark once more that the purpose of the Smalley Foundation is through cooperative work to improve the quality and standard of analytical work in determining oil and ammonia, and not to provide a prize contest. It is believed that it will be generally agreed that in this respect

Table I—Oil Results, All Samples
(Average analysis, Oil 6.84)

Rank	An. No.	Points off	Av. per sample	Efficiency
1	85	33	.0110	99.839
2	63	43	.0143	99.791
3	78	46	.0153	99.774
4	21	47	.0157	99.770
5	47	49	.0163	99.762
6	79	51	.0170	99.751
	87	51	.0170	99.751
8	64	54	.0180	99.737
9	73	58	.0193	99.718
10	1	60	.0200	99.707
11	48	62	.0207	99.697
12	88	81	.0270	99.605
13	81	87	.0290	99.576
	94	87	.0290	99.576
15	32	92	.0307	99.551
16	35	95	.0317	99.536
17	68	107	.0357	99.478
18	22	109	.0363	99.469
19	50	112	.0373	99.455
20	41	114	.0380	99.445
21	52	119	.0397	99.420
22	82	123	.0410	99.400
23	46	124	.0413	99.396
24	84	131	.0437	99.361
25	51	134	.0447	99.347
26	36	137	.0457	99.332
27	83	138	.0460	99.327
28	42	139	.0463	99.323
	53	139	.0463	99.323
30	55	143	.0477	99.303
31	3	153	.0510	99.254
32	40	155	.0517	99.243
33	96	159	.0530	99.225
34	66	167	.0557	99.185
35	90	203	.0677	99.010
36	69	205	.0683	99.000
37	54	224	.0747	98.905
38	44	231	.0770	98.872
39	86	237	.0790	98.844
40	49	253	.0843	98.766
41	2	255	.0850	98.756
42	13	326	.1087	98.411
43	77	336	.1120	98.360
44	91	361	.1203	98.240
45	92	749	.2497	96.350
46	14	846	.2820	95.875

Rank	An. No.	Points off	Av. per sample	Efficiency
58	35	81	.0270	99.648
59	39	85	.0283	99.631
60	88	96	.0320	99.583
61	29	97	.0323	99.578
	91	97	.0323	99.578
63	74	101	.0337	99.560
64	92	102	.0340	99.556
65	16	108	.0360	99.530
66	17	118	.0393	99.488
67	42	121	.0403	99.474
	82	121	.0403	99.474
69	60	124	.0413	99.462
70	15	125	.0417	99.456
71	32	130	.0433	99.435
72	14	132	.0440	99.426
73	76	137	.0457	99.404
74	77	218	.0727	99.050

Table II—Ammonia Results, All Samples
(Average analysis, Ammonia 7.67)

Rank	An. No.	Points off	Av. per sample	Efficiency
1	5	6	.0020	99.974
	52	6	.0020	99.974
3	48	8	.0027	99.965
	96	8	.0027	99.965
5	10	14	.0047	99.939
	81	14	.0047	99.939
7	30	15	.0050	99.935
8	6	16	.0053	99.931
	47	16	.0053	99.931
10	8	17	.0057	99.926
	21	17	.0057	99.926
	64	17	.0057	99.926
13	55	18	.0060	99.922
14	78	20	.0067	99.913
15	85	21	.0070	99.909
16	65	23	.0077	99.900
17	7	24	.0080	99.886
18	11	25	.0083	99.892
19	13	26	.0087	99.887
20	26	28	.0093	99.879
	66	28	.0093	99.879
22	84	29	.0097	99.874
23	73	30	.0100	99.870
24	4	31	.0103	99.866
25	1	33	.0110	99.857
	53	33	.0110	99.857
27	90	34	.0113	99.853
28	22	35	.0117	99.848
	44	35	.0117	99.848
	62	35	.0117	99.848
	69	35	.0117	99.848
	94	35	.0117	99.848
33	46	37	.0123	99.840
34	51	38	.0127	99.835
35	28	39	.0130	99.831
	89	39	.0130	99.831
37	87	43	.0143	99.814
38	3	44	.0147	99.808
39	79	45	.0150	99.805
40	24	48	.0160	99.791
41	2	49	.0160	99.787
	12	49	.0163	99.787
	18	49	.0163	99.787
	54	49	.0163	99.787
45	36	50	.0167	99.782
46	41	53	.0177	99.769
47	43	55	.0183	99.761
48	83	57	.0190	99.752
49	68	59	.0197	99.743
50	25	60	.0200	99.739
51	23	62	.0207	99.730
52	63	64	.0213	99.722
53	50	65	.0217	99.717
54	75	69	.0230	99.700
55	40	70	.0233	99.696
56	86	72	.0240	99.687
57	49	78	.0260	99.661

the Smalley Foundation continues to accomplish its purpose. It is quite apparent that much further progress is possible in the direction of more uniform results for moisture, although improvement has been noted in these results, due very largely, undoubtedly, to continued thought and study of this matter and the improvement in drying ovens now available. In conclusion the chairman wishes to thank the collaborators and the members of the committee for their cooperation at all times.

Table III—Oil and Ammonia Results, All Samples

Rank	Analyst	Efficiency
1	85	99.874
2	21	99.848
3	47	99.846½
4	78	99.843½
5	64	99.831½
6	48	99.831
7	73	99.794
8	87	99.782½
9	1	99.782
10	79	99.778
11	81	99.757½
12	63	99.756½
13	94	99.712
14	52	99.697
15	22	99.658½
16	46	99.618
17	84	99.617½
18	55	99.612½
19	68	99.610½
20	41	99.607
21	96	99.595
22	35	99.592
23	51	99.591
24	53	99.590
25	88	99.594
26	50	99.586
27	36	99.557
28	83	99.539½
29	66	99.532
30	3	99.531
31	32	99.493
32	40	99.469½
33	82	99.437
34	90	99.431½
35	69	99.424
36	42	99.398½
37	44	99.360
38	54	99.346
39	2	99.271½
40	86	99.265½
41	49	99.213½
42	13	99.149
43	91	98.909
44	77	98.705
45	92	97.953
46	14	97.650½

Table IV—Results of Other Collaborators Whose Results Deserve Recognition

Analyst	No. samples reported on	Points off Oil	Points off Ammonia
9	29	—	33
19	27	—	101
20	28	167	96
27	25	—	40
33	29	—	97
34	27-28	81	92
37	22	—	38
56	24	97	30
57	26	200	50
58	21	—	28
61	20	254	60
67	26	274	222
70	25	242	34
72	20-21	409	94
80	29	38	23
93	24	40	108
95	26	—	60
99	29	209	74
100	22-26	120	42
101	27	—	18

Table V

		No. Collaborators reporting	No. Results ± .10	No. Results ± .05	No. Results ± .02	Sample No.
			OIL			
Max.	uniformity	63	50	37	20	12
Min.	"	55	40	21	9	27
Av.	"	59	45	31	16	—
			AMMONIA			
Max.	uniformity	96	96	81	49	6
Min.	"	91	79	66	37	13
Av.	"	93	86	76	46	—

Report of Soap Section Committee

Definite Progress Achieved in Formulation of Standards for Acids Used in Glycerine Analysis.

By A. K. CHURCH, *Chairman*

AT THE fall meeting of the American Oil Chemists' Society, held in New York October 25-26, 1928, a Soap Section of the A. O. C. S. was organized. Later a committee was appointed. The personnel of the committee follows:

R. W. Bailey, Stillwell & Gladding, Inc., New York, N. Y.

A. K. Church, Lever Brothers Co., Cambridge, Mass.
Chairman, Soap Section, A. O. C. S.

C. J. Gundel, Fels & Co., Philadelphia, Pa.

L. F. Hoyt, Larkin Co. Inc., Buffalo, N. Y.

M. H. Ittner, Colgate & Co., Jersey City.

H. J. Morrison, Procter & Gamble, Ivorydale, Ohio

W. A. Peterson, Kirkman & Son, Brooklyn.
Secretary, Soap Section, A. O. C. S.

W. D. Richardson, Swift & Co., Chicago, Ill.

M. L. Sheely, Armour Soap Works, Chicago, Ill.

H. P. Trevithick, New York Produce Exchange, New York, N. Y.

R. B. Trusler, University of Pittsburgh, Pittsburgh, Pa.

The committee decided to undertake the establishment of an A. O. C. S. Standard Crude Glycerin sample and an A. O. C. S. Standard Soap sample. Mr. Morrison undertook to prepare the soap sample and Mr. Church the crude glycerin sample. Through the courtesy of the Procter & Gamble Co. the soap sample was donated and through the courtesy of Lever Brothers Co. the glycerin sample was donated.

Both of these samples have been prepared and distributed to the members of the committee. All soap chemists and glycerin chemists, whether members of the A. O. C. S. or not, are invited to do cooperative work in connection with these two samples. The following chemists are now cooperating with the committee on this work:

V. K. Cassady, The Palmolive Company, Milwaukee, Wis.

Curtis & Tompkins, Chemists, San Francisco, Cal.

H. C. Bennett, Los Angeles Soap Co., Los Angeles, Cal.

The committee cordially invites any other soap or glycerin chemist interested to participate in this work. Samples will be forwarded on request to our committee's Secretary, Mr. Peterson. It should be observed that results of individual industrial laboratories will not be published under the names of the laboratories but only under number designations. The idea back of this standardization work is to establish correct analyses for these standard samples and not to disclose differences between laboratories should there be differences.

The committee decided the standard crude glycerin sample was to be tested by the International Acetin Method, the method prescribed throughout the world in connection with sales of crude glycerin. The I. A. M. is explicit in its directions except in one respect and that is the precise method of standardizing the acid used. The Chairman suggested that each cooperating laboratory describe its method of standardizing the acid used in connection with the I. A. M. for crude glycerin. So much interest was displayed among the committee members in respect to methods of standardization of the acid that it seems likely that other chemists will also be interested in the discussion of the standardization methods actually used by representative laboratories and so comments of the committee members follow—but not in the order given above where the members of the committee are listed. It is agreed, we believe, that the use of one indicator does not give precisely the same results as the use of another indicator.

Laboratory No. 1

"We have always preferred to use N/2 hydrochloric acid for the acetin method. As a method of standardization, we use sodium carbonate that has been previously dried and have found this to be quite satisfactory. Weigh off about 2 grams of Baker's Special Sodium Carbonate C.P. into a platinum crucible and heat at a dull red heat till constant weight is obtained. Dissolve the dry sodium carbonate in 150 cc of distilled water, add 2 drops of methyl orange and titrate to a faint pink color. From this titration the factor is calculated. We have occasionally checked our N/2 HCl against silver chloride gravimetrically and obtained very close checks. The chance of error using silver chloride is less owing to the heavy weight of

AgCl handled as against the end point while using sodium carbonate."

Laboratory No. 2

"We standardize our normal sulphuric acid for glycerin determination using sodium carbonate with methyl orange as the indicator. Our method is as follows: We use the A. O. C. S. sodium carbonate or J. T. Baker's Special sodium carbonate. 10 to 15 grams of the carbonate are heated in a platinum dish over a low-flamed Argand burner to incipient redness, never hot enough for fusion, for about 2 hours to constant weight. The sodium carbonate is then put in a desiccator until it reaches room temperature. About 2.2 grams of the ignited and cooled sodium carbonate are then accurately weighed, transferred to a liter flask and dissolved in about 100 to 150 cc of cold distilled water. 3 drops of methyl orange indicator, 1 gram to the liter, are added. The tip of the burette containing the H_2SO_4 to be standardized is adjusted just outside the mouth of the neck of the flask and the mouth of the flask is covered as well as may be with a clean watch glass. This precaution is taken to prevent any loss from the rapid evolution of CO_2. When the titration is nearly completed, the watch glass and tip of the burette are rinsed with distilled water. The titration is then continued until the solution takes on, permanently, the first trace of pink. At the end of the titration the volume in flask is between 400-500 cc. A burette with Bureau of Standards certificate is used. Corrections are made for the burette reading and for the temperature. We make our standard temperature 20°C. Check results should be obtained having a spread of not more than 0.001 in normality. Finally about 4.4 g of Na_2CO_3, enough to require about 90 cc of N/1 acid, are titrated as a final checking. Various authors have been examined in respect to the standardization of acid. Scott standardizes H_2SO_4 by adding an excess of the acid to a sodium carbonate solution and titrating the excess with N/5 NaOH, using phenolphthalein as the indicator (p 494, 4th ed.). Griffin gives no standardization of H_2SO_4. His standardization of HCl is made by titrating sodium carbonate solution with methyl orange as an indicator (p 7, 1st ed.). Treadwell-Hall standardizes HCl by titration against sodium carbonate solution using methyl orange as an indicator. This authority states that H_2SO_4 may be standardized in the same manner (p 552, 5th English ed.). Sutton outlines a standardization of H_2SO_4 by titrating the acid against a sodium carbonate solution using methyl orange as the indicator (p 49, 11th ed.). The methyl orange end point is not so easy for different analysts to agree upon as is the end point with, for example, methyl red or phenolphthalein. We have done some work with methyl red and find it gives a sharper end point than does methyl orange. However, when methyl red is used as an indicator, the acid, we have found, is somewhat stronger, that is, contains a slightly greater weight of acid per cc, than when methyl orange is used. When phenolphthalein is used as an indicator, the strength of the acid, that is the number of grams of acid per cc, is somewhat different than when methyl orange is used, according to our tests. It is, therefore, rather important, although perhaps not vitally important, that all laboratories doing cooperative work using the International Acetin Method for glycerol, should standardize their master acid solutions using the same indicator."

Laboratory No. 3

This laboratory standardizes their sulfuric acid for glycerin determinations by the sodium carbonate method. Their proceeding is as follows: A 20 gram platinum crucible is half filled with J. T. Baker's C. P. Special Na_2CO_3, which is heated in the oven at 270-280°C. until it shows no loss in weight. This usually does not take longer than one hour. The crucible and contents are cooled in a desiccator. 2.0000 plus or minus .0003 grams of the dried Na_2CO_3 is weighed in a porcelain dish and brushed into a 250 cc Erlenmeyer flask. 50 cc of water is added and the carbonate dissolved without heating. Two (2) drops of methyl orange indicator are added and the solution titrated with the H_2SO_4, using a standardized burette. Calculation:

$$\frac{18.868 \times 2.00}{\text{cc. titration}} = \text{Normality}$$

The results of two titrations agreeing within 0.001 in normality are averaged, and the average used as the normality of the acid solution. This laboratory states: "We believe that this method is the one more generally recognized in all textbooks. We find it the preferred method in Mahin, Sutton, Treadwell-Hall, Fresenius, Griffin and Scott."

Laboratory No. 4

"Laboratory No. 8 puts forward a plea for the standardization of hydrochloric acid gravimetrically by means of silver chloride."

"We wish to register an objection to this method, first, on the old theoretical grounds that in standardizing by means of silver chloride, the standardization is of chlorine, not of acid hydrogen and, hence, is theoretically ques-

tionable and with impurities present practically imperfect. This laboratory standardizes N/1 sulfuric acid, for glycerin analysis, against sodium carbonate prepared from Merck's C.P. grade of sodium bicarbonate, by the well-known method standard in all textbooks. By this method, sodium bicarbonate is heated in a platinum vessel at a temperature of 270-300°C, with frequent stirring, to constant weight. About 2 grams of sodium carbonate thus prepared, accurately weighed, are dissolved without heat in recently boiled distilled water, two drops of methyl orange added and the solution titrated with the sulphuric acid, using a calibrated burette. The usual calculations and dilutions are made to adjust to normal."

Laboratory No. 5

"We use normal hydrochloric acid and standardize the same against sodium bicarbonate (Merck's C. P.). The sodium bicarbonate is heated in a platinum dish until there is no further loss in weight. The sodium carbonate is dissolved in water and titrated with the acid using methyl orange as an indicator. From this and other titrations it is adjusted and diluted to a normal solution."

Laboratory No. 6

"For the analyses of crude glycerines by the acetin method, we use N/2 hydrochloric acid standardized gravimetrically with silver chloride. As a check on this standardization, we titrate against sodium carbonate obtained from C. P. sodium bicarbonate which has previously been heated to 260-280°C for six hours, using methyl orange as an indicator. We have always used the acetin method for crude glycerines above a 60% glycerol concentration, and when all steps in the method have been carefully followed, we have been able to obtain quite satisfactory results."

Laboratory No. 7

"Our method of standardization of the N/2 sulphuric acid which we use as our main standard solution for all our work including the acetin determinations is with sodium carbonate as follows: A platinum dish is filled with C. P. sodium carbonate and heated to 270-280 and held there for 4-5 hours. It is cooled in a desiccator and one gram portions are used for the titrations, using methyl orange. Before the end point is reached the solution is boiled to expel CO_2, then cooled and the titration finished."

Laboratory No. 8

"In his letter of Feb. 12, 1929 on the Acetin Method for the determination of Glycerol, the Chairman of the Soap Section rightfully points out that the standardization of the acid used is of vital importance. Of course, the accuracy of burettes and other measuring instruments is also extremely important. There are a number of accepted ways of standardizing acids which do not always lead to the same results, as errors are apt to creep into some of these methods. To avoid inaccuracy from this source, I have always insisted that our analytical work be referred to hydrochloric acid standardized gravimetrically against silver chloride. Most of our atomic weights have been connected directly to silver chloride, and the determination of silver chloride can be done with accuracy and dispatch by any operator who is competent to standardize solutions. For the process in question, we would prefer to modify the method to the extent of using N/2 hydrochloric acid that had been standardized against silver chloride with closely agreeing duplicate determinations."

Laboratory No. 9

"This laboratory uses N/1 hydrochloric acid for the acetin method. As a method of standardization we have always preferred to use as a primary standard in acidimetry and alkalinity as recommended by the Bureau of Standards. Pure sublimed benzoic acid as supplied for a calorimetric standard is fused, for greater ease of handling. This acid in accurately weighed portions is used in neutral alcoholic solution, to standardize carbonate-free N/2 KOH and the N/1 HCl is titrated against the standardized KOH. The usual precautions of using calibrated burettes and temperature corrections are of course observed. In this method of standardization, phenolphthalein indicator is used throughout and it is also the indicator used in the Acetin Method.

NOTE: It may be of interest to this committee to know that I got in touch with the laboratories of four large chemical companies and found that of these four, one uses sodium carbonate and three use benzoic acid as their primary standard."

Laboratory No. 10

"The following is the method we use for standardizing our acid: Hydrochloric acid made up approximately N/4 is standardized against 0.5 gm. samples of Diack & Smith's Standard Sodium Carbonate using Methyl Orange for the indicator. The Sodium Carbonate has been previously dried at 140°C for one hour as per the seller's directions and is weighed from a weighing bottle into a dried clean flask and titrated immediately. The standard of purity of the carbonate used is always given on the label. The hydrochloric acid solution is made exactly N/4."

Laboratory No. 11

"Referring to the correspondence regarding hydrochloric acid we standardize gravimetrically as silver chloride. We also check by titration with sodium carbonate, using methyl orange as an indicator. We have used for this titration standardization the special sodium carbonate which has been prepared for the Society and which can be obtained from Mr. Helm, the Secretary. This material, I believe, analyzes 99.93% pure."

Method used in the Analytical Laboratory of Mellon Institute of Industrial Research—Method selected by Dr. W. W. Mills, Institute Analyst (*Quoted by permission of Dr. Trusler, Member of the Committee*)

"*Standardization of Sulphuric Acid*—The Analytical Laboratory of Mellon Institute standardizes acids against a specially prepared grade of sodium carbonate. It is prepared by precipitating sodium bicarbonate from a solution of pure sodium carbonate by saturating the solution with carbon dioxide gas. The sodium bicarbonate is filtered, washed two or three times with cold water, and dried in the air to constant weight at a temperature not above 270°C., producing pure sodium carbonate.

(NOTE: Foulk and Osborne, Department of Chemistry, Ohio State University, have studied the preparation and use of sodium bicarbonate as an ultimate standard. They have found that heating it in air above 270°C causes some decomposition. If heating and subsequent cooling is conducted in an atmosphere of carbon dioxide, the temperature may be above 270°. This investigation is to be published in the near future.)

The dried salt is dissolved in water and titrated, using methyl orange as indicator. When the first appearance of red shows, the solution is boiled to remove dissolved carbon dioxide. The solution is then cooled and the titration carried to the first color change. The usual precautions of using a calibrated burette and noting the temperature of the standard solution are observed."

Good progress is being made in the analysis of both the soap and glycerin samples and the committee hopes to be able to report accepted analyses of both samples at the fall meeting.

The Chairman and Secretary thank each member of the committee and also the cooperating laboratories not committee members for the splendid spirit of cooperation manifested in the work.

A. K. CHURCH
Chairman Soap Section Committee

Spanish production of olives and olive oil rose sharply in the 1928 season. As compared with 1927, the area planted to olives was 101.12 per cent, with a yield of 272.46 per cent in olives. The oil yield was 289.27 per cent of the 1927 crop. Production of olive oil in 1928 totaled 1,467,467,298 lbs. as compared with a 1927 crop of only 507,304,474 lbs.

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of Oil & Fat Industries, published monthly at New York, N. Y. for April 1, 1929.

State of New York; County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Alan Porter Lee, who having been duly sworn according to law, deposes and says that he is the Editor of the Oil and Fat Industries and the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, and business manager are: Publishers, MacNair-Dorland Co., Inc., 136 Liberty St., New York, N. Y.; Editor, Alan Porter Lee, 136 Liberty St., New York, N. Y.; Managing Editor, None; Business Manager, Grant A. Dorland 136 Liberty St., New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

MacNair-Dorland Co., Inc., 136 Liberty St., New York, N.Y., Ira P. MacNair, 136 Liberty St., New York, N.Y., Grant A. Dorland, 136 Liberty St., New York, N.Y.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is.....
(This information is required from daily publications only.)

[Signed] Alan Porter Lee.

Sworn to and subscribed before me this 1st day of April, 1929.

Al. J. Ruggiero, Notary Public, Kings Co., No. 509 Reg. No. 1162; Cert. filed in N. Y. Co., No. 309 Reg. No. 1R242; Commission expires March 30th, 1931.

[SEAL.]

Notes of the Industry

Discuss Tests of Olive Foots

Representatives of eighteen of the country's largest olive oil foots consumers and importers met in New York April 9, to discuss the advisability of readjusting the rule on maximum impurities and the technique of the impurities test. At the present time olive oil foots are sold on a basis of 3 percent maximum impurities with a penalty for poorer oil, but no adjustment for better grades. Although the hot kerosene test is official for detecting impurities, ether is more widely used. Some of those present were opposed to making any change in the present 3 percent maximum. A large user suggested a maximum of 1 percent impurities, with a penalty for excess. One of the large importers offered a compromise of 2 percent, with a provision for a lower price in case of excess impurities and a higher price for better grade oil. The meeting was practically unanimously in favor of making the ether test official, inasmuch as it corresponds more closely than the hot kerosene test with the carbon bisulfide method, which is in general use in producing centers. It is expected that an official ruling will be promulgated by the Produce Exchange Committee shortly after May 1.

Chemical Industries Exposition

The Twelfth Exposition of Chemical Industries, being held at Grand Central Palace, New York, the week of May 6th, surpasses all previous Chemical shows by a wide margin. The exhibits include raw materials, finished products and the machinery and equipment used in the chemical industries, together with many educational exhibits which set forth the results of most recent research by government departments and large industrial organizations. An important feature of the Exposition consists of the Students' Course on the Fundamentals of Industrial Chemistry and Chemical Engineering Practice, sessions of which will be held each morning during the week of the Exposition. Professor W. T. Reed of the Texas Technological College will act as Chairman of the Course.

Imports of Fatty Foods

The Foodstuffs Division of the Department of Commerce has issued figures showing the value of imports and exports of foodstuffs during the year 1928, with comparative figures for 1927. Exports of animal fats and oils, edible, exceeded imports many times in value, while the trade in edible vegetable oils and fats showed a preponderance of imports, which consisted entirely of olive oil and cocoa butter. Imports of oil cake and oil-cake meal increased substantially in both quantity and value in 1928 over 1927, imports of soya bean cake particularly showing almost 100 percent increase. The Foodstuffs Division's comment on the trend of foodstuffs exports and imports is as follows: "The balance is preponderantly in favor of exports of all products produced in the United States, but the heavy consumption of tropical and subtropical products results in imports of foodstuffs exceeding the total of exports.

Sixth Annual Chemical Industries Banquet

The most important get-together dinner of the chemical and allied industries is held annually in New York under the auspices of the leading technical societies of the country. The dinner this year will be the sixth renewal of the event, and is being held at the Roosevelt Hotel, Thursday, May 9th, under the auspices of the American Chemical Society, American Electrochemical Society, American Institute of Chemists, American Leather Chemists' Association, Chemical Warfare Association, American Association of Textile Chemists and Colorists, Manufacturing Chemists' Association, Societe de Chimie Industrielle, Society of Chemical Industry, The Chlorine Institute, Compressed Gas Manufacturers' Association, Synthetic Organic Chemical Manufacturers' Association, Technical Association of the Pulp and Paper Industry, Salesmen's Association of the American Chemical Industry and the Chemists' Club. The principal speaker of the evening will be Colonel William J. Donovan, formerly Assistant Attorney General of the United States.

Standards Yearbook for 1929 has recently been compiled by National Bureau of Standards, Washington, D. C., and is available at $1.00 per copy, through the Superintendent of Documents, Government Printing Office, Washington.

Mayonnaise Makers Declare for Quality

William R. McKeldin, Chairman of the Trade Practice Committee of the Mayonnaise Products Manufacturers, has addressed the members of the Association in a bulletin urging the maintenance of the highest quality in all their products and the abandonment of expensive trade practices, such as cut prices, free goods, special deals, etc. We quote excerpts from the bulletin: "Quality is the only way to build up a permanent business on a firm foundation. Quality and cut prices, free goods, special deals, do not travel together for very long . . . Trade Associations in every line of endeavor are daily realizing the necessity for getting together to eliminate some of these expensive practices, and if we are properly informed, the results have been very gratifying and well worth the trouble and time taken . . . Every member can help by advising the Secretary of the Association or the Trade Practice Committee of the evils existing in his territory and of any suggestions to correct them and then let every member cooperate to correct such conditions when the time comes.

Oil and Fat Research

At the Seventy-seventh Meeting of the American Chemical Society, held at the University of Ohio, Columbus, April 29 to May 3, several papers of interest to our readers were presented, particularly at the meetings of the Division of Agricultural and Food Chemistry. Among the papers read to this Division of the Society were the following:

"Effects of Variation of Ingredients upon the Color of Chocolate Cake" by Emily Grewe and E. O. Whittier.

"A Study of the Official Method for the Polarimetric Determination of Lactose in Milk" by E. F. Almy.

"A Formula Expressing the Relation between Fat and Protein in Normal Milk" by A. E. Perkins.

"Fatty Acid Glycerides" by H. E. Robinson, J. N. Roche, and C. G. King.

"The Commercial Utilization of Waste from the Cotton Gin" by C. L. Fly, H. J. Harper, and O. M. Smith.

Referee Applicant

Mr. Harry M. Bulbrook, Industrial Laboratories, Fort Worth, Texas, has applied for Referee Chemist's Certificate of the American Oil Chemists' Society on all products covered by the Rules of the Interstate Cottonseed Crushers' Association. (*Second Publication.*)

United Africa, Ltd.—Palm Merger

When the merger of the African & Eastern Trading Co. and the Niger Co. is completed, the combined companies will operate under the name of United Africa, Ltd.

Shareholders in African & Eastern approved the merger March 28. The approval of the Niger stockholders has been looked on as a foregone conclusion since the largest block of stock is held by Lever Bros., Ltd. Under the agreement reached by the two boards, the two companies will go into the merger on an equal basis. African & Eastern will receive 6,500,000 shares of Class A stock and Niger will have the same number of shares of Class B. All of the holdings of both companies are involved with the exception of minor operations on both sides. United Africa, Ltd., which will be capitalized at £14,000,000, will have a dominating position in West African trade in palm oil, cocoa, etc. The plan is to make the merger effective April 30 at which time plans for the New York subsidiaries will probably be announced. Neither J. H. Redding or R. G. Morris, respectively heads of Niger and African & Eastern in the United States, are in position to give out any definite information at this time.

The Baltimore Butterine Company, Baltimore; Ed. S. Vail Butterine Company, Chicago; and Kansas Nut Margarine Company, Salina, Kansas, have filed suit in the Federal district court in Denver, Colorado, asking for an order against Governor Adams, Attorney General Winbourn and the State Dairy Commissioner, restraining them from enforcing the law which would class nut oil products as margarin and subject them to the 10-cent Federal oleomargarin tax. Attorneys for the plaintiffs contend that the law is unconstitutional. The Colorado law specifically applies to those nut oil products which are colored and packed like butter, even though plainly marked "Nut Products."

Charles E. Carpenter

Charles E. Carpenter, president and general manager of E. F. Houghton & Co., industrial oils, Philadelphia, died April 7 at Miami Beach. He was sixty-six years old. Mr. Carpenter, for more than thirty-five years, was active in local, State and National Republican politics. He was a member of the Manufacturers' Club, Poor Richard Club, Philadelphia Country Club, White March Valley Country Club, Manasquan River Yacht Club and a number of other organizations. A wife and a son, A. E. Carpenter, survive.

Interstate Crushers' Convention

The Interstate Cottonseed Crushers' Association will meet in their annual convention at the Roosevelt Hotel, New Orleans, Louisiana, May 15, 16 and 17. The Rules Committee will meet at the same place on May 13 and 14. Chairman Harry Hodgson and other members of the Rules Committee invite suggestions or recommendation for changes in the Rules of the Association. These suggestions should be prepared for presentation according to Section 2, Article 2 of the By-laws.

Mr. E. T. George has again agreed to serve as Chairman of Arrangement Committee and Master of Ceremonies. Other Committeemen are:

H. H. Landry, Vice Chairman—Arrangements.
A. D. Geoghegan, Chairman—Reception.
Mrs. L. G. Cosgrove, Chairman—Ladies Entertainment.
E. Percy Chivers, Chairman—Hotel Reservations.
W. E. Jervey, Chairman—Golf Tournament.
Dan W. Feitel, Chairman—Harbor Trip.
A. F. Aschner, Chairman—General Entertainment.
H. P. Rowley, Chairman—Dance and Theatre.
T. W. Coffer, Chairman—Banquet.
I. T. Rhea, Chairman—Publicity.
Jack Murphey, Chairman—Markets.
George Sarrat, Chairman—Automobiles.
A. M. Juge, Chairman—Registration and Badges.

Shortening and Oil Association

At the last meeting of the Shortening and Oil Division of the Interstate Cotton Seed Crushers' Association, the members present devoted the meetings to a discussion of the problem of eliminating the discriminatory and uneconomic conditions in distribution of cottonseed oil products to the retail trade resulted in the adoption of a resolution providing for such modification of the Code of Trade Practices as will enable members distributing to the retail trade to make such sales on the basis of open prices and terms publicly announced, as is now done with sales to the wholesale and baking trade.

If the proposed modification of the Code is given the approval of Senator Benet, Counsel of the Interstate Cotton Seed Crushers' Association, it is expected that members will soon begin merchandising to the retail trade on the basis of prices publicly announced.

Members expressed the belief that discriminatory and other uneconomic and uncompetitive conditions now existing in distribution to the retail trade might be eliminated largely by extending the provisions of the Code to cover such trade. The successful operation of such a plan, it was pointed out, obviously would require that distributors make their prices likewise public. Considerable discussion concerned the question of the extent to which distributors of members' products might voluntarily co-operate with and ensure the success of the plan by giving publicity to their own prices and terms of sales.

It was repeatedly emphasized during the discussion and thoroughly understood by all members of the Division that in selling to distributors manufacturers would have no right to dictate to such distributors or use any coercive methods with respect to the prices or terms such distributors might employ in making resales of members' products.

The following resolution was adopted:

Whereas there is a discrimination in the present tariff schedule between edible vegetable oils of a similar character, whereby one such oil, namely Sesame Oil, is on the free list, while others are dutiable at various tariff charges, and

Whereas such discrimination is unjust and disturbing to the economic situation of edible oils in United States markets,

Therefore, be it resolved, that the Shortening and Oil Division of the Interstate Cotton Seed Crushers' Association respectfully requests the House Ways and Means Committee at Washington, in its consideration of necessary changes in the present tariff laws, to place Sesame Oil on the same basis as other edible vegetable oils of like character.

Amtorg Trading Corp., representing Soviet Russia commercial and industrial organizations, recently moved from 165 Broadway to 261 Fifth Ave., New York. The seventeenth and eighteenth floors have been leased at the new location, giving the company 28,000 sq. ft. of floor space.

The new $1,000,000 plant being built by Continental Can Co. at Los Angeles is rapidly nearing completion. It was built to replace the plant destroyed by fire some months ago. William Berryman, formerly with Western Can Co., San Francisco, will manage the new plant.

Market Report on

FATS, OILS AND GREASES

(As of April 30, 1929)

NEW YORK—The prices of oils, fats and greases continued downward throughout the recent period. Price changes were numerous, and almost all of these changes represented revisions downward. Uncertainty still prevailed due to the proposed tariff changes causing consumers to buy from hand to mouth. Coconut oil and corn oil were lower again. Cottonseed oil declined to a low price for the season. Lard was steady, but the greases were lower. Linseed oil, red oil and stearic acid were unchanged. Olive oil, olive oil foots, palm oil and palm kernel oil were slightly lower, as was tallow. Chinawood oil showed the only appreciable firmness.

Chinawood Oil

Renewed political disturbances in China caused uncertainty in the Chinawood oil market, and served to advance prices on coast and future material. Quotations were 13¼ to 13⅜c lb. for coast and future oil. Spot oil in bbls. or drums was still obtainable at 14½c to 14¾c lb.

Coconut Oil

Lack of interest on the part of buyers caused a decline in the price of coconut oil. Prices were ⅛c to ⅜c lower per lb. on all grades at the close of the period. Copra was generally quoted at 4½c lb.

Corn Oil

Corn oil continued to decline during the period, and was quoted ¼c to ⅜c per lb. lower at the close. Tanks were offered at 8⅛c to 8¼c lb., with bbls. at 10¾c. Refined oil in bbls. was priced at 11¾c.

Cottonseed Oil

This oil declined further during the period, reaching a new low price for the season. Crude was quoted at 8⅛c to 8¼c lb., with P. S. Y. at 9⅞c to 10c lb. Reports on the new cotton crop were considered favorable.

Grease

Prices on all greases were slightly lower, in step with the rest of the market. Demand was good at the lower price levels. Quotations at the close were: white, 7⅞c to 9½c lb.; yellow and house, 7½c to 7⅝c; brown, 7⅜c to 7½c.

Lard

Lard held steady at 12c lb. in spite of general weakness almost everywhere else in the oil and fat market. Compound was priced lower inside, ranging from 12c to 12½c lb. Arrivals of hogs from the West were reported as light.

Linseed Oil

Linseed oil was unchanged in price, the base price for crude in cars remaining at 10 1/10c lb. Boiled oil in tanks was still at 9 7/10c, with refined in bbls. at 10⅘c to 11⅕c. Cake was priced substantially lower at $43 to $44 a ton, with meal also much lower at $50 to $51 a ton.

Olive Oil and Olive Oil Foots

The market on these two oils was relatively quiet, but firmed up on foots latterly. Both olive oil and olive oil foots were quoted lower at the close of the period than at the start.

Red Oil and Stearic Acid

There was no change in price on either of these articles, the market continuing steady with a fair amount of business. Prices of raw materials for the making of stearic acid continued downward.

Palm and Palm Kernel Oil

Easier conditions in competing products resulted in lower prices for Palm and Palm Kernel oil. Lagos was quoted at 8¼c to 8½c lb., with Niger at 8c lb. Kernel oil in packages was priced at 8⅛c to 8⅜c lb.

Tallow

Quotations on tallow were reduced during the period, closing at 9c to 9¼c for edible material. City extra was priced at 8¼c lb., with special at 8c. Demand was inactive making a quiet market.

A California paper reports the recent sale of a controlling interest in the California Products Company of Fresno, California, for $250,000, to Albert M. Paul of Los Angeles.

The manufacturing activities of the company, according to the Fresno daily paper, consist of "cotton ginning, manufacture of vegetable oil from cottonseed and from raisin seed together with grape brandy as a by-product from raisin seed." We cannot vouch for the accuracy of the report but in view of the "by product" possibilities it would seem that Mr. Paul secured a bargain.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¾	.14
No. 3, bbls.	lb.	.13¼	.13½
Chinawood, bbls. or drs.	lb.	.14½	.14¾
Coast, tanks, spot	lb.	.13¼	.13⅜
Futures	lb.	.13¼	.13⅜
Coconut, Ceylon grade, bbls.	lb.	.08⅞	.09
Coast, tanks	lb.	.07⅜	—
Cochin grade, bbls.	lb.	.09	—
Manila, bbls.	lb.	.08⅞	—
Tanks, N. Y.	lb.	.07¾	—
Coast tanks	lb.	07⅜	—
Fatty acids, mill, tanks	lb.	.11¾	—
Cod, Newfoundland, bbls.	gal.	.63	.64
Copra, bags, Coast	lb.	.04½	—
Corn, tank, mills	lb.	08⅛	.08¼
Bbls., New York	lb.	.10¾	—
Refined, bbls.	lb.	.11¾	—
Fatty acid	lb.	.10¾	—
Cottonseed, crude, tanks, mill	lb.	.08⅛	.08¼
P. S. Y.	lb.	.09⅞	.10
Fatty acids, mill, bbls.	lb.	.11	—
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03¾	.04¼
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08¼	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbls. N. Y.	lb.	.07⅞	.09½
Yellow	lb.	.07½	.07⅝
Brown	lb.	.07⅜	.07½
House	lb.	.07½	.07⅝
Bone Naptha	lb.	—	.07⅜
Herring, coast tanks	gal.	.40	.42
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.12	—
Compound, tierces	lb.	.12	.12½
Middle Western, tierces	lb.	—	.12¼
Neutral, tierces	lb.	—	.14
Prime Western, tierces	lb.	.12½	—
Lard oil, No. 1, bbls.	lb.	.12¾	—
No. 2, bbls.	lb.	.12½	—
Extra, bbls.	lb.	.13¼	—
No. 1, bbls.	lb.	.13	—
Winter strained, bbls.	lb.	.13½	—
Prime, bbls.	lb.	.15¼	—
Linseed Oil, boiled, tanks	lb.	.0970	—
Car lots, bbls.	lb.	.1050	—
Less car lots, bbls.	lb.	.1090	—
Less than 5 bbls.	lb.	.1130	—
Double boiled, less than five bbls.	lb.	.1160	.1170
Raw, tanks	lb.	.0930	—
Car lots, bbls.	lb.	.1010	—
Less car lots, bbls.	lb.	.1050	—
Less than 5 bbls.	lb.	.1090	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1080	.1120
Varnish grades, bbls.	lb.	.1100	.1140
Linseed cake, bags	ton	43.00	44.00
Meal, bags	ton	50.00	51.00
Menhaden, crude, tanks, Baltimore	gal.	—	Nom.
Light pressed, bbls.	gal.	.71	.73
Yellow bleached, bbls.	gal.	.73	.75
White bleached, bbls.	gal.	.76	.78
Mustard, bbls.	gal.	.95	—
Neatsfoot, cold pressed, bbls.	lb.	.18¾	—
Extra, bbls.	lb.	.13	—
No. 1, bbls.	lb.	.12¾	—
Pure, bbls.	lb.	.14¾	—
Oleo, No. 1, bbls.	lb.	.11¼	.11½
No. 2, bbls.	lb.	.10¾	.11
No. 3, bbls.	lb.	.10½	—
Olive, denatured, bbls., N. Y.	gal.	1.30	1.35
Shipments	gal.	1.25	1.27
Foots, bbls.	lb.	.10⅛	.10¼
Shipments	lb.	.10	.10⅛
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, cakes spot	lb.	.08¼	.08½
Shipments	lb.	.07¾	—
Niger, casks, spot	lb.	.08	—
Shipments	lb.	.07½	—
Palm Kernel, pkgs.	lb.	.08⅛	.08⅜
Tank cars	lb.	.07⅝	.07¾
Peanut, crude, bbls.	lb.	.11½	—
Mills, tanks	lb.	.09¾	—
Refined, bbls.	lb.	.13¼	—
Perilla, bbls.	lb.	.13½	Nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.04	1.06
Refined, bbls.	lb.	.85	.86
Red Oil, distilled, bbls.	lb.	.11	.11½
Tanks	lb.	.10¼	—
Saponified, bbls.	lb.	.11	.11½
Tanks	lb.	.10¼	—
Salmon, coast, tanks	gal.	.42½	.45
Sardine, coast, tanks	gal.	.45	.47
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.11¾	.12
Orient, coast tanks	lb.	.08¾	.09
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.86
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.16½	.17
Triple pressed, bags	lb.	.18	.18½
Stearine oleo, bbls.	lb.	.10¼	.10½
Tallow, edible, bbls.	lb.	.09	.09¼
City extra, works, loose	lb.	.08¼	—
Special, works, loose	lb.	.08	—
Tallow oil, acidless, bbls.	lb.	.11¼	—
Tanks, N. Y.	lb.	.11	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Packaging of Lards

(*From Page 21*)

manufacturer's trademark. The cartons are lined with vegetable parchment paper before being filled.

For export shipment, lard and shortening are packed in all the varieties of packages used for domestic consumption and in addition pure lard is packed in parchment-lined rectangular boxes of wood, each holding forty-four pounds.

Filling Machinery and Methods

THE handling of lard and shortening in the packing departments of manufacturers is a comparatively simple process, involving only rapid cooling of the product to obtain the proper consistency, and pumping of the semi-fluid lard or shortening into the package. Practically all lard and shortening is cooled on machines known as lard rolls, which consist

(Courtesy Ohio Pail Co.)
Standard steel pail increasingly used for lard, shortening, cooking oils, etc.

of horizontal revolving steel drums, cooled by brine or ammonia. The material to be cooled is picked up in a thin film by the surface of the drum, cooled as the drum revolves, and scraped off by adjacent knives after a nearly complete revolution. It is then kneaded and worked in a picker trough or worm conveyor, or both, and pumped by a heavy duty rotary pump direct to the package. There have been numerous machines devised for the automatic filling and weighing of the various type packages used.

Several points are of importance in connection with cooling and packaging the products, in order to obtain uniform quality and consistence. The temperatures of the lard or shortening going to the cooling roll and leaving it must be uniform at all times, as must be the amount of working and pumping after cooling. The moisture content of the atmosphere in the cooling and filling room is most important as the products will absorb moisture rapidly in the chilling operation. There have been many instances where excessive moisture in lard or shortening has caused rusting of the metal containers, even through a tin coating, with consequent discoloration of the product.

Eventually all manufacturers of these products will find it to their advantage to control the temperature and humidity of the air in their cooling and filling rooms. Some years ago the writer was called into consultation for the correction of a compound shortening which developed "vaseliny" spots and streaks in the packages from a week to ten days after filling. Formula, temperatures, mixing, cooling and filling methods were checked without revealing the source of the error, until, almost by accident, a heavy charge of static electricity was discovered in the chilled shortening as it flowed into the packages. The presence of the static charge was due in this case to the particular location of the plant. Simple grounding of the filling pipes corrected the condition and the streaks failed to appear in the product thereafter.

Shortening Exports in January

Exports of cotton oil shortening by the United States in January of this year amounted to 444,022 pounds, at a valuation of $62,668, while exports of compounds containing animal fat amounted to 321,236 pounds, valued at $40,848. Nearly 25 per cent of the cotton oil shortening went to Mexico. Cuba took 83,000 pounds, and the other West India Islands about 75,000 pounds. Chile was the largest importer of our compound, taking 50,000 pounds. Shipments not included above were 132,354 pounds of compound to Hawaii, which also bought 114,683 pounds of cotton oil shortening. Porto Rico got 56,376 pounds of compound, 25,585 pounds of cotton oil shortening and 310,845 pounds of oleomargarine of both animal and vegetable oil content.

OIL & FAT INDUSTRIES

The Editor's Page

Simplified Practice Benefits

EVERY progressive manufacturer will appreciate the economies resulting from the campaigns of the Division of Simplified Practice of the Bureau of Standards, Department of Commerce for fewer and better package specifications. A survey of the packages used in the vegetable shortening industries revealed that there were thirty-five varieties of containers in use, but that 97 percent of the total volume of goods packed was shipped in only eleven of these container varieties.

The Division has recommended, therefore the elimination of the remaining twenty-four varieties of container as stock containers, and the recognition of the principle that shipments made in such containers are on special order and not part of the general business procedure. Practically the entire vegetable shortening industry has adhered to the principles of the reduction in number of container varieties, as recommended by the Division. The Associated Cooperage Industries of America have also signified their adherence to the plan. The value of such simplification practice to the manufacturers, jobbers and dealers in vegetable shortening are immediately apparent. The reduction in inventories of empty and filled packages would alone repay the cost and effort of making the change, without consideration of the savings accomplished in accounting and purchasing departments.

This is but one of many examples of constructive cooperation of Government with industry inaugurated in the Department of Commerce by our present President.

Tariffs and . . . Taffy

YEARS ago when we were just little fellows, our fathers often designated buncombe as "Taffy." This word has lost some of its popularity for use in this connection having been replaced by such stronger terms as "Bunk," "Hooey," "Apple sauce," and the like. Nevertheless the older term seems to us particularly applicable to a large percentage of the cloying wordiness which has been so characteristic of Capitol Hill this Spring. All of this sugar-coated material is manufactured for the delectation of constituents, mostly rural, for the solons are commencing to awaken to a realization that the White House is occupied by a Man. A man who is, besides, an Economist, and who is not willing that the entire Foreign Trade of the United States shall be destroyed in a futile effort to subsidize a selected portion of our population. In this connection, we wonder if anyone, even has actually heard a farmer say, "Times are good and I am prosperous." We have known many farmers in our time, seen many of them riding in expensive motor cars, but we have yet to hear one of them make that admission, even when cotton was forty cents a pound and wheat "way out of sight." In spite of the fulminations which preceded its appearance, the Smoot-Hawley Proposed Tariff Act appears to be the product of careful consideration and sane reasoning applied to the problem of giving American farmers and manufacturers some additional protection, without overburdening the consumer or destroying the tediously-woven fabric of our Foreign trade. The fatty oil industries in particular are to be congratulated that the outrageous suggestions of the dairy lobby have not been permitted to prevail, and that the industry as a whole has been very fairly treated. Let us hope that the Senate Radicals, who are at the moment engaged in pulling more "Taffy" for *their* constituents, will get the job over with in a reasonably short time, so that business may resume its confident upward swing, secure in the knowledge that our good customers abroad will retain the opportunity of selling us some part of their production of necessities and luxuries, thereby obtaining the wherewithal to purchase from us those necessities, luxuries and automobiles which they need so badly, (according to our Export Sales Staff).

Cottonseed Crushings Gain

COTTONSEED crushed during the seven months ended with February totaled 4,230,549 tons against 4,028,539 tons in the same period a year ago, according to figures made public by the United States Census Bureau. Receipts during the period totaled 4,858,266 tons, against 4,422, 412 tons, and stocks on hand at

the close of February totaled 646,849 tons, against 483,157 tons February 29, 1928.

Texas mills received by far the greatest quantity of the country's cottonseed during the period, receipts totaling 1,650,265 tons, against 1,484,928 tons in the same period a year ago, followed by Mississippi mills with 600,372 tons, against 525,206 tons; Georgia, 384,777 tons, against 411,510 tons; Arkansas, 383,033 tons, against 301,916 tons; Oklahoma 376,948 tons, against 358,386 tons; Tennessee, 295,537 tons, against 260,796 tons; North Carolina, 290,739 tons, against 285,095 tons; Alabama, 258,254 tons, against 286,371 tons; Louisiana, 203,720 tons, against 154,457 tons and South Carolina, 197,618 tons, against 194,208 tons.

The output of cottonseed products during the period included 1,323,254,856 pounds of crude oil, against 1,263,036,767 pounds in the same period a year ago; 1,100,475,389 pounds of refined oil, against 992,089,257 pounds; 1,901,701 tons of cake and meal, against 1,795,998 tons; 1,141,249 tons of hulls, against 1,143,722 tons; 890,783 running bales of linters, against 747,373 bales; 53,885 five-hundred-pound bales of hull fiber, against 59,734 bales and 35,346 five-hundred-pound bales of grabbots, motes, etc. against 28,723 bales.

Exports of cottonseed products for the six months ended with January 31 included 13,687,856 pounds of crude oil, against 27,665,229 pounds in the period ended with January, 1928; 4,797,334 pounds of refined oil against 4,650,018 pounds, 214,202 tons of cake and meal, against 255,628 tons, and 104,014 running bales of linters, against 99,713 bales.

Oil Chemists' Golf Tournament

THE Annual Golf Tournament of The American Oil Chemists' Society was held on the Links of The Metairie Golf Club, New Orleans, on the afternoons of May 13 and 14. There was an impressive list of prizes, headed by the Challenge Cup donated by Industrial Chemical Sales Co. Other prizes included a gold medal, from Louisiana Gas Co., a zipper golf bag, from Darco Sales Corporation, a matched driver and brassie, from Bennett Clark Company, a leather traveling bag, from Arthur H. Thomas Co., a dozen golf balls, from Peerless Clay and Minerals, Inc., and a Chemists' slide rule, from E. H. Sargent & Co.

The winners of prizes were as follows:

Low Gross:	Cup and Medal	E. R. Barrow
Second:	Golf bag	L. B. Forbes
Low Net:	Golf clubs	W. H. Irwin
Second:	Golf balls	R. W. Perry
Blind Bogey:	Traveling bag	Lehman Johnson
Second:	Slide rule	J. J. Vollertsen

Protest Iodine Test for Starch

SOME manufacturers of mayonnaise have been attacking competitive products which contain starch, and advising the general public of methods of testing mayonnaise and mayonnaise products for the presence of starch by the addition of iodine. In this connection, Frank Honicker, Executive Secretary of the Mayonnaise Products Manufacturers Association has addressed the members as follows:—

"Entirely aside from the ethics of advertising which has appeared in some newspapers relative to the iodine test for starch in mayonnaise, or the use to which some salesmen have put this to in an endeavor to sell their own brand of mayonnaise, you will be interested in the reply received from Dan Gray, Chairman of our Standards and Research Committee, to a letter from the Chairman of our Trade Practice Committee. Mr. Gray, as you know, is an experienced chemist, and his reply is interesting:

" 'In all of the technical reference books which were consulted, and which had any bearing on the reaction between iodine and starch have no definite chemical reaction between starch and iodine, except for the fact that starch was the only material so far as is known which gives this blue reaction with iodine.

" 'Apparently the compound formed is of such complex chemical nature that no definite formula can be ascribed to it, in fact the exact chemical nature of starch itself is most complex. Several reference books refer to the blue compound formed as iodised starch.

" 'Page 420, Volume 1, Allen's Commercial Organic Analysis, states, that the only organic compound liable to interfere with the iodine test is erythrodextrin, which itself causes an intense reddish brown coloration with iodine which is apt to mask the starch reaction. Allen goes on to state that the affinity of iodine for starch is, however, greater than its affinity for erythrodextrin, and hence, if a very little iodine solution be employed, a blue, due to starch alone, will become apparent, brown becoming apparent on further dilution of the reagent. By cautiously adding very dilute ammonia or gradually heating the liquid, the brown color can be destroyed, while the blue remains.

" 'With regard to the test itself on mayonnaise, it indicates only that the product contains some starch. The amount need not be great, as the test is very sensitive. It does not indicate inferiority, unless the addition of starch could be construed as such.

American Oil Chemists' Society Convention

Twentieth Anniversary Celebrated at Enthusiastic Well-Attended Meeting in New Orleans

MARKING the completion of its first score years of growth and progress, the American Oil Chemists' Society assembled for its Twentieth Annual Convention at the Roosevelt Hotel, in New Orleans, on May 13th and 14th. A large percentage of the membership was present and many interesting and instructive original papers, addresses and committee reports were presented. Many of these were published in the previous issue of *Oil & Fat Industries,* some appear elsewhere in this issue, and the remainder will be published in coming issues.

The Minutes of the meetings follow:

First Day, Monday, May 13, 1929:

Meeting called to order 9:45 A. M. by E. G. Williams, Chairman, Local Arrangements Committee.

Invocation.

President Putland officially declared the 20th Annual Meeting in session.

Felix Paquin, a Charter Member and the first President of the Society, addressed the meeting. Dr. Paquin presented a sketch of the Society from its birth to the present year.

Reading of the Minutes of the last annual meeting was omitted upon motion duly seconded and carried.

With Vice President W. R. Stryker, in the chair, President Putland delivered his annual report as President. On motion this was referred to a special committee composed of H. B. Battle, P. P. Hindelang, C. H. Cox.

The Secretary-Treasurer, J. C. P. Helm, read his annual report, which was referred to the Auditing Committee.

Report of the Governing Committee. As there were amendments to the By-laws in the minutes of the Governing Committee that had been acted upon by the Governing Committee in session Sunday, May 12, 1929, the President explained his address covered most of the matters attended to by the Committee during the session, but the Secretary would read the Minutes of May 12, 1929, Governing Committee containing the Amendments. The Secretary read the Minutes. On motion they were adopted.

W. R. Stryker, of New Orleans, newly elected President of The American Oil Chemists' Society

The Amendments to By-laws were as follows:

ARTICLE III, Section (e): The President and four Vice-Presidents shall be elected at each annual meeting by a majority vote of all members present. The Fourth Vice-President shall be a member of the Soap Section of the Society, and his name shall be furnished the Nominating Committee at the annual meeting of the Society. The Fourth Vice-President shall be the Presiding Officer at all meetings of the Soap Section, and shall represent the Soap Section at all meetings of the Governing Committee. The Secretary-Treasurer shall be elected in the same manner upon nomination by the Governing Committee.

ARTICLE IV, Section (a): The Governing Committee shall consist of the President, four Vice-Presidents, and four most recent

ex-presidents of the Society. The eldest ex-president in point of service shall be automatically dropped from the committee each year, and his place taken by the retiring president. The Governing Committee shall be the general executive body of the Society.

C. B. Cluff suggested that a copy of the revised Constitution and By-laws be sent every member by the Secretary-Treasurer when the next membership rolls were sent out. The Secretary-Treasurer was instructed to do this.

At this time the proceedings were interrupted for a while to allow Mr. Hamner, Chairman of the Golf Committee, to make announcements relative to the Tournament. The Secretary was instructed to write the donors of prizes and thank them in the name of the Society.

Report of Membership Committee by Chairman W. R. Stryker. Accepted with thanks of Society.

Paper, "Studies on Gossypol." E. P. Clark.

After Dr. Clark had presented his paper, Mr. Barrow informed the Society that through the publicity given the results of the work of Dr. Clark the sales of cotton seed meal for feeding had advanced materially. Dr. Clark answered several questions relative to his work.

Report of the Cotton Seed Analysis Committee. C. H. Cox. Mr. Cox explained this was a progress report. Accepted.

Paper, "A Preliminary Report on the Study of Methods for Cottonseed Analysis." G. S. Jamieson and R. S. McKinney. Accepted with thanks of Society.

At this time Mr. Meloy gave a short address on Seed Sampling.

Report of Color Committee. W. D. Hutchins. On motion this report was referred to Planning and Uniform Methods Committee. Mr. Hutchins recommended that the next Color Committee be instructed to confer with General Electric Co., with reference to Dr. Hardy's Electrical Color Recording Instrument.

Report of Special Committee on Color Readings. W. D. Richardson. As Dr. Richardson was not at the meeting, the report was read by W. H. Irwin. Accepted.

Report of Refining Committee. C. B. Cluff. On motion this was referred to Planning and Uniform Methods Committee.

T. C. Law, Chairman of Chemists' Committee of Interstate Cotton Seed Crushers' Association, answered questions, presented and discussed proposed methods and changes in methods of analysis to be presented at meeting of Interstate Cotton Seed Crushers' Association.

The following committees were appointed by President Putland:

Nominating Committee:

C. B. Cluff, Chairman; R. H. Fash, H. Aspegren, L. C. Howe, L. B. Forbes.

Auditing Committee:

Dr. Felix Paquin, Chairman; J. D. Evans, J. R. Mays.

E. G. Williams announced the Banquet would be at the Jung Hotel, 6:30 P. M., Tuesday, May 14, 1929.

Meeting adjourned till 9:30 A. M. next day, Tuesday.

Second Day, Tuesday, May 14th, 1929:

Meeting called to order by President Putland, 9:30 A. M.

Report of The Soap Section. A. K. Church, Chairman. Mr. Church suggested Planning and Uniform Methods Committee evolve a method for standardizing the Master Standard Acid Solution used in our laboratories.

Paper "The Co-operative Work of the A. & M. College of Texas with the Cottonseed Oil Mill." C. C. Hedges, Head of Department of Chemistry and Chemical Engineering A. & M. College of Texas. Dr. Hedges was thanked for his very interesting paper.

Report of the Kreis Test Committee. A. S. Richardson, Chairman. W. D. Hutchins read the report for Mr. Richardson. Report received. Mr. Durkee requested the Committee continue work on other oils also.

Report of Committee on the Effect of Crude Mill Operations on Crude Oil Produced. A. K. Schwartz, Chairman. The report was read by J. J. Ganucheau. Report received with recommendations to have this work continued.

Report of Fat Analysis Committee. W. D. Richardson, Chairman. In the absence of Dr. Richardson, report was read by W. H. Irwin. Report received.

Report of the Moisture Committee. W. H. Irwin, Chairman. On motion report was not read, as it was published in Journal. Mr. Irwin related some of the troubles of getting the manufacturers to live up to the specifications in making the ovens, but stated all had been settled satisfactorily. He asked any members having ovens not right to send them back to makers. Report received.

Paper "Palm Oil from Belgian Congo." G. S. Jamieson and R. S. McKinney. Paper read by Dr. Jamieson.

Report of Referee Examining Board. W. H. Irwin, Chairman. Report received.

There was a general discussion. C. B. Cluff suggested the Referee Board send out blind samples to all Referee Chemists in future, so as to check their work. H. Aspegren suggested the Referee Chemists pay the costs of sending the samples out. On motion of Lehman Johnson, duly seconded and carried, the matter was

referred to Governing Committee to provide means to supply funds for sending out check samples.

Report of Olive Oil Committee. Louis M. Roeg, Chairman. Dr. Roeg not being at the meeting, the report was read by J. C. P. Helm, Secretary. Report received.

Report of Special Committee on Method for Determining Free Fatty Acids in Refined Oils. M. M. Durkee, Chairman. Motion by W. H. Irwin that the report be referred to Planning & Uniform Methods Committee. Seconded by R. W. Perry. Carried.

Report of Detergents Committee. L. T. Howells, Chairman. A. K. Church had the report in the absence of Mr. Howells, and suggested it not be read as it was long and would be published in the Journal. Mr. Irwin moved this be done. Seconded and carried.

Report of Smalley Foundation. H. C. Moore, Chairman. Mr. Moore not being at the meeting the report was read by H. B. Battle. Report received.

A vote of thanks was given by the Society to H. C. Moore for his work in directing the Smalley Foundation, and also to T. C. Law for handling the work of sending out the samples so efficiently.

Report of Committee on Publication of Methods. W. H. Irwin. Mr. Irwin made report, relating some of the troubles of getting methods together and printed. Report received.

Report of Planning and Uniform Methods Committee. J. J. Vollertsen, Chairman.

This report is published in full elsewhere in *Oil & Fat Industries*.

Upon motion duly seconded and carried all of the recommendations of the Uniform Methods Committee were adopted as recommended by the Committee.

Reports of Special Committees.

Report of Auditing Committee. Felix Paquin, Chairman. Accepted and ordered spread upon the minutes.

Report: "Your Auditing Committee wish to report that after examination of your Secretary-Treasurer's accounts, we find the books are well kept and correct."

Report of the Committee on President's address. H. B. Battle. On motion the report was adopted and Mr. Putland given vote of thanks by Society for work during year as President.

Miscellaneous Business.

Dr. Trusler moved that Mr. Church, through Soap Section, appoint a special committee to investigate and devise standard method for standardizing master standard acid solution in laboratory. Seconded and carried.

Telegrams from R. C. Hatter and W. G. McLeod received, and letter from David Wesson received; all stating they were sorry they could not be at meeting.

Report of the Nominating Committee. C. B. Cluff, Chairman. The Committee offered the following nominations:

President	W. R. Stryker,
1st Vice-President	W. H. Irwin,
2nd " "	C. W. Rice,
3rd " "	A. S. Richardson,
4th " "	A. K. Church.

Election of Officers.

F. Paquin moved that the nomination for president be closed, and that the Secretary-Treasurer be instructed to cast ballot for W. R. Stryker, as President. Seconded and carried.

Mr. Putland retired and Mr. Stryker took the chair as President.

Lehman Johnson moved that the nomination for First Vice-President be closed and that the Secretary-Treasurer be instructed to cast ballot for W. T. Irwin as First Vice-Pesident. Seconded and Carried.

W. D. Hutchins moved that the nomination for Second Vice-President be closed and that the Secretary-Treasurer be instructed to cast ballot for W. H. Irwin as First Vice-President. Seconded and carried.

Lehman Johnson moved that the namination for Third Vice-President be closed and that the Secretary-Treasurer be instructed to cast ballot for A. S. Richardson as Third Vice-President. Seconded and carried.

Lehman Johnson moved that the nomination for Fourth Vice-President be closed and that the Secretary-Treasurer be instructed to cast ballot for A. K. Church as Fourth Vice-President. Seconded and carried.

J. C. P. Helm was nominated for Secretary-Treasurer by W. R. Stryker acting for Governing Committee. On motion Secretary-Treasurer was ordered to cast ballot for himself.

There being no further business the 20th Annual Meeting was declared adjourned by President, W. R. Stryker.

The Institute of American Meat Packers has established a fellowship at the University of Minnesota to study stability tests of shortening used in baking, particularly in biscuit and cracker making. This will include hog lard as well as cotton oil shortenings and compounds of the latter with animal fats.

Palm Oil From The Belgian Congo[1]

A contribution from the Oil, Fat and Wax Laboratory, Bureau of Chemistry and Soils, United States Department of Agriculture.

By GEORGE S. JAMIESON and ROBERT S. MCKINNEY

PALM oil is obtained from the fibrous-fleshy portion of the fruit from the numerous varieties of the palm Elaeis guineensis, a native of tropical West Africa, which has been introduced into other regions and which is being extensively cultivated in Sumatra. Formerly, all the oil exported from Africa was prepared by very crude inefficient native methods, but in recent years, owing to the rapidly increasing competition in the world markets of the Sumatra product, which is of superior quality, serious attempts are under way in the Belgian Congo, Nigeria, and some other African localities to introduce modern equipment and methods for handling the fruit and preparing the oil, besides giving attention to improving the natural groves of palms so that they will become more productive. Also, in some African localities experimental plantings are being made. As a result of these efforts, some of the African palm oil is of notably better quality than that formerly exported.

For those not familiar with this product, it may be stated that commercial palm oil varies in color from yellow to a deep orange, and sometimes is dark brown. The color depends largely upon the variety of the fruit and the method of preparation. At ordinary temperatures, the oil varies from a semi-liquid consistency to the hardness of tallow. The higher the percentage of free fatty acids, the harder is the oil. Large quantities of the oil are used by the tin plate industry and soap manufacturers. The high grade oil is being used in increasing quantities in making margarine for which it is particularly well adapted.

The composition of palm oil has received until recently but little attention. Armstrong and Allan (J. Soc. Chem. Ind. 1924, *43*, 216 T), state that the fatty acids from a sample of the oil, the source of which is not given, contained the following percentages of acids: Oleic —48; linolic—7; myristic—1; palmitic—35.5; and stearic—8.5.

A. Rayner and S. G. Campbell (J. Soc. Chem. Ind. 1928, 47, 149 T) examined nine samples of palm oil from different localities and found that the percentages of the saturated acids varied from 39.7 to 57.9. According to their determinations, these fractions contained from 12.5 to 18.5 per cent of stearic acid. By means of the iodine numbers, they estimated that the unsaturated acid fractions contained, on the average, 20 per cent of linolic acid and 80 per cent of oleic acid.

In view of repeated requests for further information on the characteristics and composition of palm oil, the following investigation was made on an authentic sizable sample of H. C. B. Plantation Palm Oil from Port Maladi, Belgian Congo, which was kindly furnished by the Lever Brothers' Plant at Cambridge, Mass. This sample, which was orange colored, was very soft and had a delicate, pleasant odor.

The chemical and physical characteristics are given in Table I. It will be observed that the Reichert-Meissl value is very low as compared with that (.7 to 1.9) previously reported, but according to Elsdon (Edible Oils and Fats, p. 319) palm oils of good quality would be expected to give a negligible Reichert-Meissl value, and further the high values reported would be correct only in the case of rancid oils. The percentage of saturated and unsaturated acids was determined by the lead-salt-ether method, and corrections were made for the small quantity of unsaturated acids that are precipitated and weighed with the saturated acid fraction (J. Amer. Chem. Soc. 1920, *42*, 2398; Cotton Oil Press, 1922, *6*, 41). The percentage of unsaturated acids has also been corrected for the unsaponifiable matter that remains with the unsaturated fraction.

The range of the characteristics reported by various observers is as follows: Density at 15°, .920 to .926; refractive index at 40°, 1.453 to 1.457; saponification value, 196 to 205; iodine number, 48 to 58; Reichert-Meissl value, 0.7 to 1.26; Polenske number, 0.4 to 0.6; melting point, 27 to 50°; titer, 38 to 47°, and unsaponifiable matter, 0.3 per cent. As previously mentioned, the large variation in the melting points is due to the wide range in the quantity of free fatty acids.

[1] Presented before the American Oil Chemists' Society at New Orleans, La.

Table I

PALM OIL CHEMICAL AND PHYSICAL CHARACTERISTICS

Specific gravity 25/25°	0.9146
Refractive index at 40°	1.4578
Acid value	20.65
Saponification value	197.9
Unsaponifiable matter (%)	0.39
Iodine number (Hanus)	53.7
Acetyl value (Andre-Cook)	15.27
Reichert-Meissl value	0.10
Polenske number	0.29
Saturated acids (corrected) (%)	44.3
Unsaturated acids (corrected) (%)	50.6
Iodine number of Unsat. acids	99.9

Unsaturated Acids

THE iodine number of the unsaturated acids is 99.9, indicating that this fraction consists of oleic acid (Iodine number 90.1) and linolic acid (iodine number 181.4). The following percentage composition of the unsaturated acids fraction was calculated from these figures:

	Per cent	In Oil Per cent	Glycerides in Oil Per cent
Oleic Acid	89.36	45.17	47.2
Linolic Acid	10.64	5.38	5.6

William Brash (J. Soc. Chem. Ind. 1926, *45*, 438T) found that the unsaturated acids in a sample of neutralized palm oil amounted to 48.5 per cent.

Saturated Acids

THE saturated acids, which were separated from the mixed fatty acids of the oil by the lead-salt-ether method, were esterified with absolute methyl alcohol, using dry hydrogen chloride gas (J. Amer. Chem. Soc. 1920, *42*, 1200), and the resulting esters were fractionally distilled under diminished pressure. The data for the distillation are given in Table II.

TABLE II

FRACTIONAL DISTILLATION OF METHYL ESTERS OF SATURATED ACIDS

(109.6 g. taken for distillation)

Preliminary distillation under 2 mm. pressure	Fraction	Temp. °C	Weight Grams
	A	160 to 163	21.40
	B	164	22.70
	C	165	22.60
	D	166 to 167	21.70
	E	170 to 180	19.10
	Residue		2.00
Final distillation under 2 mm. pressure			
Fractions A + B added	1	150 to 155	10.70
	2	156 to 157	23.30
Fraction C added	3	157	23.05
" D "	4	157 to 161	23.52
" E "	5	162 to 166	20.05
Residue "	6	173 to 185	8.50
	Residue		.37

The preliminary distillation was made from a 500-cc. Claisson flask, giving 5 fractions and a residue of undistilled esters, all of which were redistilled in the order indicated in the table, from a 150 cc. Ladenburg fractionation flask. Six fractions and a small residue were obtained.

Examination of Fractions

THE iodine numbers and the saponification values of these six fractions were determined and are recorded in Table III.

The iodine numbers of the various fractions are the measure of the contaminating unsaturated acid, and from these values the percentage of the esters of these unsaturated acids was calculated. From these percentages and the saponification values the mean molecular weight of the saturated acid esters in the several fractions was calculated. The mean molecular weights indicate what saturated acids may be present in each fraction. For example, the mean molecular weights of the saturated acid esters in fraction 1 and 2 (Column 5, Table 3) are between those of methyl myristate (242.3) and methyl palmitate (270.3), indicating that this fraction contains both esters, whereas the molecular weights of fractions 3, 4, 5, and 6 indicate that they consist of various proportions of methyl palmitate and stearate (298.4).

In order to determine the correctness of these deductions, the free fatty acids were recovered from several of the fractions by saponifying them with alcoholic potash, removing the alcohol, dissolved the soaps in water, and decomposing them with hydrochloric acid. The constituent saturated acids entirely freed from mineral acid were isolated by fractional crystallization from ethyl alcohol. Their identity was established by the melting points and by observing whether or not the melting points were lowered when the substances were mixed with equal quantities of the respective acids which they were suspected of being, the purity of which had been established by analysis.

The deductions drawn from the molecular weights of the saturated acids were confirmed as follows: The final residue was saponified with alcoholic potash, and the fatty acids were liberated with hydrochloric acid, collected, dried and crystallized from about 12 cc. of 95 per cent alcohol. The crystallizable fatty acids were subjected to fractional crystallization and finally 0.1401 grams of stearic acid, melting at 68-9°, and 0.1900 grams of lignoceric acid, melting at 80.-80.5°, were obtained. No arachidic acid could be isolated.

Table III

PALM OIL

RESULTS OF ANALYSIS OF FRACTIONS OBTAINED BY DISTILLING THE METHYL ESTERS

Fraction	Iod. No.	Sap. Val.	Esters of Unsat. Acids %	Mol. Wt. of Sat. Acid Esters	Myristic Acid %	Myristic Acid Gram	Palmitic Acid %	Palmitic Acid Gram	Stearic Acid %	Stearic Acid Gram	Lignoceric Acid Gram
1	0.96	209.3	1.00	267.8	7.76	0.8303	85.51	9.1395			
2	1.12	207.6	1.15	270.0	0.96	0.2238	92.77	21.6161			
3	1.52	206.7	1.57	271.1			90.69	20.9500	2.67	0.6149	
4	3.0	205.6	3.15	272.2			85.70	20.1560	6.25	1.4700	
5	7.4	201.9	7.78	276.6			68.25	13.7822	19.35	3.9713	
6	11.9	192.9	12.51	289.7			26.09	2.2230	58.37	4.9620	
Res.										0.1401	0.1900
Totals						1.0541		87.8628		11.1583	0.1900

Lignoceric acid ($C_{24}H_{48}O_2$) melting at 80. to 80.5° was isolated from the residue; stearic acid ($C_{18}H_{36}O_2$) melting at 68-9° was separated from fractions 4 and 6 as well as from the residue; palmitic acid ($C_{16}H_{32}O_2$) melting at 63° was obtained from fractions 1 and 3. Ten crops of crystals were obtained from the fractional crystallization of the fatty acids from fraction 1 by gradually reducing the volume of the alcoholic solution and finally by adding small quantities of water. The tenth and eleventh crops of crystals which melted at 54 to 55° were myristic acid ($C_{14}H_{28}O_2$).

The quantity of saturated acids in the fractions were calculated from the mean molecular weight of their esters and the theoretical molecular weight of the two esters in each fraction.

Table IV

PALM OIL

SATURATED ACIDS

Acids	Saturated Acid Fraction Grams	Saturated Acid Fraction Per Cent	Acids in Original Oil Per Cent	Glycerides in Original Oil Per Cent
Myristic	1.054	1.05	0.47	0.51
Palmitic	87.867	87.63	38.85	40.75
Stearic	11.158	11.13	4.93	5.15
Lignoceric	0.190	0.19	0.08	0.08
		100.00	44.33	

In Table IV, the percentage composition of the saturated acids is given in Column 2. These values calculated to the basis of the original oil are given in Column 3. Column 4 gives the equivalent percentages of the glycerides.

Summary

THE chemical and physical characteristics of a sample of palm oil from the Belgian Congo, Africa, have been determined. The oil was found to contain 44.33 per cent of saturated and 50.55 per cent of unsaturated acids.

The composition of the oil has been determined with the following results:

Glycerides of		Per Cent
Oleic	acid	47.2
Linolic	"	5.6
Myristic	"	.5
Palmitic	"	40.8
Stearic	"	5.2
Lignoceric	"	.1
Unsaponifiable	matter	.39

This is the first time that lignoceric acid has been reported as a constituent of palm oil.

Linseed Survey Completed

THE Tariff Commission has concluded its work in connection with the cost of production investigation covering flaxseed and is now preparing to submit its findings to President Hoover. The President, in turn, it was explained plans to re-submit the report to the House Committee on Ways and Means, along with the findings of the Commission in other investigations involving the costs of production of halibut, hosiery, fir logs, corn, canned tomatoes and tomato paste, and window glass. The purpose of deferring executive action on these reports was said at the Commission to be due to a desire of Mr. Hoover to prevent a duplication of work which is being performed by Congress in enacting a new tariff law.

General Naval Stores Co., Inc., New York City Branch announces the appointment of Mr. Howard Goodman, 940 Seneca Street, Buffalo, New York as their exclusive Buffalo Agent.

Report of 1928-1929 Color Committee

By W. D. HUTCHINS, *Chairman*

SUCH correspondence on the number of glasses which constitute a standard set of Lovibond Color Glasses and the number of individual glasses to be used for the determination of a color has been passed on to this Committee. The inherent defects of the method of color comparison, the many existing unstandardized variables, the confusion resulting from the standardization of the red color glasses, and the personal equation present makes this determination a very hard one to secure as concordant results as desired. The determinations are probably affected more and made less accurate by the above elements than the limit of error caused by the use of one, two or three glasses. However, the Committee has made an effort to recommend changes which would standardize some of the variables in the method and make it more definite.

The Committee considered the following points: Standard set of glasses; definite number of glasses used in each determination; type of tintometer; source of light and bulb; container for holding oil and filter paper. In addition to this, it was brought to our attention that Mr. Arthur C. Hardy of the Massachusetts Institute of Technology had designed a colorimeter or color analyzer which might be of interest to our Society. This matter was taken up with Mr. Hardy, and he advised as follows:

"This instrument is really a photoelectric spectrophotometer which automatically draws a spectrophotometric curve in about thirty seconds. Although it was designed originally to measure the color of opaque objects, it can be used equally well for the color of solutions. The precision of the instrument is some ten times or more better than that of the human eye. I am pleased to be able to inform you that the General Electric Company has very recently undertaken to build these machines in quantity. As you know, the development of a commercial instrument takes time and it may be several months before any announcement can be made with respect to the price or date of delivery. I am very glad to know of your interest and I shall make some tests along this line to determine the suitability of the instrument for your purposes. I have written a complete description of this instrument which will be published shortly in the Journal of the Optical Society of America. As soon as reprints are available I shall see that you obtain one." In later correspondence Mr.

COMPARATIVE READINGS SUBMITTED BY COMMITTEE

Sample	A Copes: Color Y.	Color R.	Red Glasses	B Schwartz: Color Y.	Color R.	Red Glasses	C Agee: Color Y.	Color R.	Red Glasses	Color Y.	Color R.	Red Glasses
1	10	1.1	2	8	0.8	1	20	0.9	1	20	0.7	1
2	35	2.1	2	20	2.6	1	20	2.5	2	20	2.7	2
3	35	3.1	2	35	3.4	2	20	3.6	2	20	3.8	2
4	35	5.0	1	35	4.9	2	35	4.8	2	35	4.8	2
5	35	6.3	2	35	6.5	2	35	6.4	2	35	6.2	2
6	35	7.8	2	35	8.2	1	35	7.8	2	35	7.6	2
7	35	10.5	2	35	10.9	2	35	10.8	2	35	10.2	2
8	35	16.5	3	35	16.1	3	35	16.1	1	35	16.0	3
9	35	18.7	3	35	20.5	2	35	18.7	2	35	18.3	3

Sample	D Grant: Color Y.	Color R.	Red Glasses	E Hutchins: Color Y.	Color R.	Red Glasses	Color Y.	Color R.	Red Glasses
1	8	1.1	2	6	1.0	1	6	1.1	1
2	25	2.2	1	20	2.2	1	20	2.0	1
3	35	3.3	2	35	3.1	2	35	3.0	1
4	35	4.3	2	35	4.5	1	35	4.5	1
5	35	5.7	2	35	6.0	1	35	6.0	1
6	35	7.4	2	35	7.6	1	35	7.6	1
7	35	9.9	2	35	10.1	2	35	10.1	2
8	35	15.4	3	35	16.0	1	35	16.0	1
9	35	21.0	2	35	18.7	2	35	19.0	2

A—Tintometer—Wesson Type, Eyepiece aperture ¼"; Palo North Skylight Lamp, 600 Watt clear glass and a blue filter. Readings average of two observers.
B—Tintometer—Emil Greiner.
C—Tintometer—Bailey Modification of Emil Greiner.
D—Tintometer—Wesson Type; 100 Watt Blue Frosted Bulb.
E—Tintometer—Emil Greiner; 150 Watt Daylight Bulb.
Note: One yellow glass used in each determination and only the glasses listed in standard set. All readings made at standard temperature and in tubes ¼" diameter.

Hardy was offered samples of oil on which to experiment, but in reply he advised that it would be some time next summer before the Color Analyzers will be available.

Nine samples of oil of various colors were submitted to the members of the Committee for examination, and they were asked to consider the points mentioned in the third paragraph in making these readings. A special request was made that they use only the glasses recommended in this report as a standard set. The results are given in the tabulation on page 19.

Mr. Schwartz made readings using different colors and different strength bulbs, and from the data given below, came to the following conclusion: Whether the bulb is frosted, blue or plain makes little difference provided we standardize on one. Observation has been that plain blue lamps give slightly darker readings than either the plain or frosted lamp. The 50 Watt lamp is too weak for oils as high as 20.0 red and 150 Watt is too powerful for oils lighter than 2.5 red. The 100 Watt Daylight lamp should be adopted as standard.

	75 Watt Frosted Bulb			75 Watt Plain Bulb			50 Watt Plain Bulb			75 Watt Daylight			150 Watt Daylight		
	Color		Red G.	Color		Red G.	Color		Red G.	Color		Red G.	Color		Red G.
Sample	Y.	R.		Y.	R.		Y.	R.		Y.	R.		Y.	R.	
1	8	0.8	1	8	0.9	1	8	0.9	1	8	0.8	1	8	0.9	1
2	20	2.3	1	20	2.3	1	20	2.4	1	20	2.6	1	20	2.4	2
3	35	3.4	2	35	3.4	2	35	3.4	2	35	3.4	2	35	3.5	2
4	35	4.6	2	35	4.6	2	35	4.6	2	35	4.9	2	35	4.6	2
5	35	6.1	2	35	6.0	1	35	6.1	2	35	6.5	2	35	6.3	2
6	35	7.5	1	35	7.5	1	35	7.5	1	35	8.2	1	35	7.8	2
7	35	10.4	1	35	10.4	1	35	11.0	2	35	10.9	2	35	10.5	2
8	35	16.1	3	35	15.7	1	35	16.6	3	35	16.1	3	35	15.6	2
9	35	20.5	2	35	20.2	1	35	21.3	3	35	20.5	2	35	20.3	2

The Committee makes the following recommendations to the Society:

1—That a standard set of Lovibond glasses consists of the following yellow and red glasses:

Yellow:	4.0	6.0	8.0	10.0	14.0	16.0	18.0	20.0	35.0 and 50.0
Red:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	1.0	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0
	7.6	8.9	9.0	10.0	11.0	12.0	16.0	and	20.0

2—That the following number of glasses be used to make a color determination: Only one yellow glass, not more than two red glasses up to and including 13.0 red; not more than three red glasses above 13.0 red.

We see no reason why the determination of grade should not be made with the above glasses instead of one yellow and one red as specified in the present rule unless this Society is prepared to find a way to supply the glasses of the exact standard. The present glasses such as 7.6 red and 12 red, when standardized by the Bureau of Standards, are found to be off. This necessitates the using of other glasses.

3—That the Society adopt the Enclosed Wesson Type Tintometer. We realize that this tintometer is not satisfactory in every way, but is the most satisfactory yet designed and recommended to the Society. It is recommended to the Society only until a more satisfactory one has been designed and adopted by the Society. The most satisfactory tintometer of this type is offered as the Emil Greiner Company's Constant Light Colorimeter.

4—That only artificial light produced by 100 Watt Blue Frosted Electric bulb be allowed. It is necessary to make this change as the manufacturers have discontinued making the 75 Watt daylight blue lamp.

5—That the Society adopt the tube for holding the samples of oil to be examined, eliminating from the rule the glass oil sample bottle.

6—The Committee feels that the question of filter paper is a problem for the Refining Committee as well as the Color Committee. There is evidence that on off oils, cold pressed oils, and oils not refined 'clear' that the type of filter paper makes a great deal of difference in color. When oils are refined perfectly 'clear' the type of filter paper is not so important. At the present, it is sufficient to recommend a good heavy grade, close texture, white paper.

The following changes in the method are submitted for your approval:

Present Method:

(a) Apparatus—Tintometer consisting of a light-proof box with dull black interior, containing a 75-watt "daylight" electric light bulb, with a block of magnesia with white reflecting surface set at a proper angle to reflect the light vertically upward through the tube containing the sample of oil and through the standard color glasses alongside the tube of oil, and receptacles for holding the tube of oil and the color glasses. An eyepiece fits over the oil tube and color glasses so that the light passing through both may be observed simultaneously.

Suggested Change:

(a) Apparatus—Enclosed Wesson Type Tintometer consisting of a light proof box with dull black interior containing 100 Watt Blue Frosted Electric Light bulb, a block of magnesia with white reflecting surface set at a proper angle to reflect the light vertically upward through the tube containing the sample of oil and through the standard color glasses alongside the tube of oil, and receptacles for holding the tube of oil and the color glasses. An eyepiece fits over the oil tube and color glasses so that the light passing through both may be observed simultaneously.

Present Method:

Lovibond Standard Color Glasses—Red and yellow, of suitable numbers to match the color of the oils to be examined. (Red glasses to be standardized by U. S. Bureau of Standards.)

Suggested Change:

Lovibond Standard Set of Color Glasses—The standard set shall consist of the following numbers of red and yellow glasses:

Yellow:	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	35.0	and 50.0
Red:	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	2.0
	2.5	3.0	3.5	4.0	5.0	6.0	7.0	7.6	8.0	9.0	10.0
	11.0	12.0	16.0	and 20.0							

All red glasses to be standardized by U. S. Bureau of Standards.

Present Method:

Glass Oil Sample Bottles or Tubes, for holding the samples of oil to be examined. These must have a flat, smooth, polished bottom of clear colorless glass, not less than ¾ inch inside diameter and provided with a mark to indicate an oil column 5¼ inches in depth.

Suggested Change:

Tubes for holding the samples of oil to be examined—These must have a flat, smooth, polished bottom of clear colorless glass, not less than ¾ inch inside diameter and provided with a mark to indicate an oil column 5¼ inches in depth.

Present Method:

(b) Determination—Fill a tube or bottle (see paragraph above) with the oil to be examined to a depth of 5¼ inches. Oil must be at a temperature of 20° to 24° C. and must be clear and transparent. Filter through white filter paper at 20° to 24°C. if necessary to remove turbidity to permit matching the color, and in such cases note on your report that filtering was necessary. If, however, the oil or fat under examination is not completely liquid at 20°C., heat until completely liquefied, and read the color at a temperature not more than 10°C. above that at which it becomes completely liquefied. Place the tube containing the oil in the tintometer and place alongside of it such yellow and red color glasses (see paragraph [a]) as are necessary for making the comparison desired, observing the colors of the oil and the glasses through the eyepiece. Only one yellow glass and one red glass must be used to match the color of the oil in every case where color standards are mentioned to establish the grade. Report the numbers of the yellow and red glasses which match the color of the oil; or if a standard combination is specified to be used (as prime for example), report whether the oil is prime or off as compared with the standard.

Suggested Change:

(b) Determination—Fill a tube (see paragraph above) with the oil to be examined, to a depth of 5¼ inches. Oil must be at a temperature of 20° to 24°C. and must be clear and transparent. Filter through good heavy grade, close texture, white filter paper at 20° to 24°C. if necessary to remove turbidity to permit matching the color, and in such cases note on report that filtering was necessary. If, however, the oil or fat under examination is not completely liquid at 20°C., heat until completely liquefied, and read the color at a temperature not more than 10°C. above that at which it becomes completely liquefied. Place the tube containing the oil in the tintometer and place alongside of it such yellow and red color glasses (see paragraph [a]) as are necessary for making the comparison desired, observing the colors of the oil and the glasses through the eyepiece. In matching the color, use only one yellow glass, not more than two red glasses up to and including 13.0 red, and not more than three red glasses above 13.0 red. Report the numbers of the yellow and red glasses which match the color of the oil; or if a standard combination is specified (as prime for example) report whether the oil is prime or off as compared with the standard.

Note: Mr. Agee does not agree in recommending a given type tintometer.

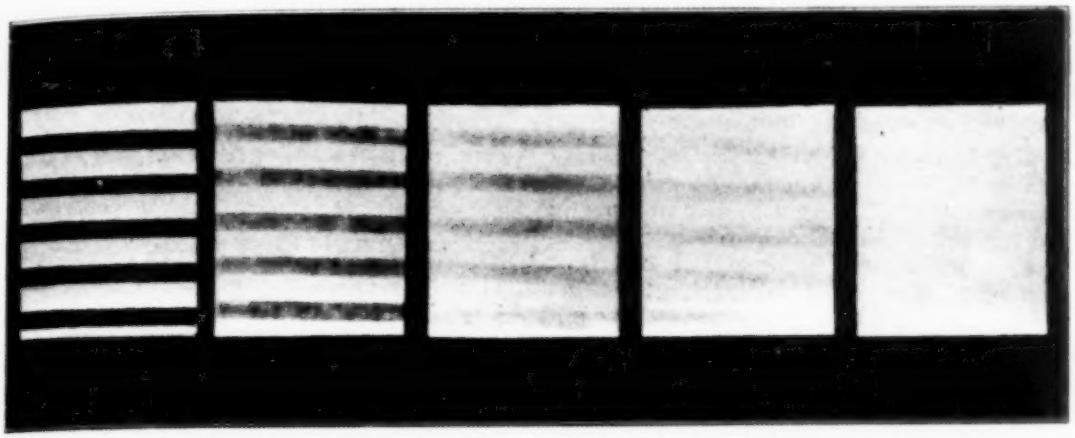
W. D. HUTCHINS, *Chairman*
G. W. AGEE
A. K. SCHWARTZ
L. G. COPES
G. L. GRANT

Dr. Deane B. Judd, of the Bureau of Standards, U. S. Department of Commerce, has completed some experiments on the effect of temperature changes on Lovibond color glasses. The effect of increasing the temperature of the glasses is to shift the curve of spectral transmission somewhat toward the red. Both yellow and red glasses show this sort of shift. The shift for a 35 yellow glass is four or five times as great as that for a 7.2 red glass. The difference is almost negligible in the color grading of cottonseed oil. *Bur. Stand. J. Res.* 1,859-66 (1928).

Determination of Detergency of Soap Products

A Progress Report by the Detergents Sub-Committee of the American Oil Chemists Society

By L. T. HOWELLS, *Chairman.*



Photographic record of results of progressive washings in Standard Detergency Test

THE report on the work accomplished by the Detergents Committee in 1926 (L. F. Hoyt, Journ. Oil & Fat Ind. Jan. & Feb. 1927) clearly indicated that the washing device and methods used in soiling and evaluating results were unsatisfactory. However, the work was essential because the difficulties encountered in desizing, soiling, washing and comparing results could not otherwise be realized in view of the many complexes involved. It was evident from the results that a uniform standard soil applied at one source would eliminate many of the difficulties and a change in the principle of the laboratory machine and method of evaluating results was necessary in order to justify further work in solving the problem before the committee.

In the preliminary report of the work accomplished by the committee in 1927 (Guernsey & Howells, Journ. Oil & Fat Ind. Nov. 1927) the idea of using a standard soiled cloth which would take care of both soiling and evaluating problems was advanced. A quantity of cloth was uniformly soiled by printing a design upon the fabric, using a printing paste composed of gum tragacanth, starch, mineral oil, tallow and lamp black. The number of washes necessary to remove all traces of the soil (contrast with the original unsoiled areas) was proposed as an index of detergency. Practical washing tests in standard laundry machines proved satisfactory and it became evident that a laboratory machine approaching the efficiency of a standard laundry machine was essential if tests were to yield useful results.

The work in 1927 (F. H. Guernsey, *Chairman*) was brought to a standstill because a suitable laboratory machine was not available and the members of the committee, who received samples of the cloth, were asked to submit suggestions for a more efficient machine.

Detergents Committee—1928

P. H. Walker, Bureau of Standards, Washington, D. C.

A. K. Church, Lever Bros., Cambridge, Mass.

J. G. Vail, Philadelphia Quartz Co., Philadelphia, Penna.

H. C. Bennett, Los Angeles Soap Co., Los Angeles, Cal.

F. W. Smither, Bureau of Standards, Washington, D. C.

W. D. Appel, Bureau of Standards, Washington, D. C.

W. C. Preston, Procter & Gamble Co., Ivorydale, Ohio.

W. H. Burkhardt, Gold Dust Corp., Baltimore, Md.

E. B. Millard, Mass. Institute of Technology, Cambridge, Mass.

L. F. Hoyt, Larkin Co., Inc., Buffalo, N. Y.

M. L. Sheely, Armour Soap Works, Chicago, Ill.

F. H. Rhodes, Cornell University, Ithaca, N. Y.

C. J. Post, National Oil Products Co., Harrison, N. J.

H. S. Mitchell, Swift & Co., Chicago, Ill.

Foster D. Snell, Pratt Institute, Brooklyn, N. Y.

L. T. Howells, *Chairman*, Cowles Detergent Co., Cleveland, Ohio.

In the early part of 1928, two machines were proposed and a meeting was called at the Bureau of Standards, April 14th, for the purpose of discussing the proposed cloth, the most suitable machine and tests to be conducted.

The following is a report on the meeting:

Soiled Cloth: It was agreed that the last traces of soil are hardest to remove and that the number of washes required to completely remove the soil is an index of detergency worthy of trial. The following points were cited in favour of the proposed cloth:

1. Mechanically soiled. (Preferably at one source) Personal equation is largely eliminated.
2. Can be applied on any kind of material.
3. Affords a simple means of measuring detergency. Delicate instruments not required.
4. Soil can be any specific dirt or mixture.
5. The cloth has practical possibilities.

To what extent aging will affect the soil is one of the problems to be studied after the method has been tested. Samples of washed cloth were exhibited. Mr. Appel furnished samples washed in the proposed machine and the chairman showed samples washed in a commercial laundry.

It was decided that in testing the method the experiments should be confined to one soil, such as lamp black, instead of complicating matters by adding kaolin, umber, rouge or other proposed soils. The only change to be made at present in the soiling mixture is the substitution of colourless Nujol for the A.O.C.S. mineral oil. The lamp black is to be No. 14, manufactured by Seaver & Company of Boston, a supply of which will be purchased by the chairman.

The composition of soil after drying will be:

Wheat Starch	56.82
Gum Tragacanth	3.41
Tallow (A.O.C.S.)	11.36
Nujol Oil	11.36
Lamp black	17.04
	99.99

For testing the method, the chairman will furnish two yards of the soiled cloth for each member.

Machine: It was agreed that last year's machine was unsuitable for this work. A small machine resembling a commercial wheel was exhibited by the chairman.

The merits of Mr. Appel's machine were very readily noted. It consists essentially of a battery of 20 pint jars revolving at a definite speed in a water bath which is kept at constant temperature. In each jar 15 rubber balls (d-3.2) are placed with a piece of standard soiled cloth three inches square in 100 cc. of solution. The speed of the jars should be in the neighborhood of 52 R.P.M. to insure greatest action.

Mr. Appel gave a talk on what he had accomplished in washing tests and gave the members present a photograph and blue print of the machine and a photograph showing the results of washing the cloth with cubes and balls. The tests proved that the balls were more effective.

The Research Committee of the American Association Textile Chemists and Colorists are planning to have several of these machines made. If the Detergents Committee have machines made up jointly with them the price will undoubtedly be much lower. The machines are not to be equipped with a driving mechanism or motor by the manufacturer. It will be up to the individuals to adjust the machines to the specified R.P.M. All members at the meeting signified that they would purchase one of these machines, providing the price was not unreasonable. The rubber balls will be furnished by Dr. Walker.

Tests: The following represents the approximate conditions under which the method is to be tested:

1. The soap will be furnished by the Chairman. It will have a titre of about 38 degrees. The percentage is not to be calculated on a bone-dry basis. The strength of the solution is to be .2% soap (soap as received taken as 100%).
2. The cloth samples are to be three inches square and cut in the same manner as a sample which will accompany the cloth.
3. A twenty-minute suds followed by two five-minute rinses (all at 160° F.) will constitute one wash. Distilled water is to be used throughout and all solutions are to be heated to temperature before use. The volume of solution in all cases will be 100 cc.
4. In each jar 15 balls are to be placed together with the cloth and 100 cc. of solution.
5. In conducting the test a piece of the cloth is placed in each of 10 jars. At the end of each wash one of the pieces is removed. After drying and ironing the samples are to be mounted on black cardboard. The number of washings corresponding to the piece which no

longer shows any visible trace of the soil is to be recorded as the index of detergency.

6. A duplicate test will be independently run within three days. To check up on aging, it is very important that the date of both runs be recorded.

The above procedure under uniform conditions will undoubtedly test this proposed method and if found favourable a more elaborate and practical set of experiments will follow.

Following this meeting W. D. Appel provided the members with a blue-print of the proposed machine and we are quoting below his specifications:

"The standard washing machine shall consist of a shaft which can be rotated at a constant speed of 42-3 R.P.M. Firmly attached to the shaft and rotating with it are one-pint glass topped Atlas E-Z Seal preserve jars in which the sample and wash solution are placed. The jars are 6 inches in height, 3¼ inches in diameter, and have a capacity of 1.2 pints. They are arranged radially about the shaft, the base of the jar being 2 inches from the center of the shaft. Provision shall be made for maintaining the temperature of the wash solution to within 2° F. of that specified for a given test."

The work in testing the method was held up because the members, at the meeting, decided to consider a machine being manufactured by the Atlas Co., for the American Textile Chemists. The machine known as the Launder-Ometer met Mr. Appel's specifications and sufficient members obtained machines to test the method. The necessary supplies (soiled cloth and soap) were put in the hands of the members having machines by the chairman and the following test was conducted.

The Conditions Governing Test

1. Distilled water shall be used thruout, and all solutions shall be heated to temperature before use. (150° F)

2. The strength of suds solutions shall be .2%. The percentage is not to be calculated on a bone-dry basis (soap as received taken as 100%).

3. The test pieces shall be 2½" x 4", and cut in the same manner as the sample received.

4. In each jar 10 rubber spheres, 1 cm. in diameter and weighing approximately 1.5 grms. shall be placed together with the cloth in suds solution.

5. A 20 minute suds, followed by two 5 minute rinses, (all kept constant at 150° F) shall constitute one wash. The volume of the suds bath shall be 100 cc. and the volume of the rinses 200 cc.

6. In conducting the test, a piece of test cloth shall be placed in each jar as specified above, and at the end of every wash, one of the pieces shall be removed. After drying and ironing, the test pieces shall be mounted on black cardboard in the order washed. The number of washings corresponding to the piece which no longer shows any visible trace of the soil shall be recorded as the index of detergency.

7. The test shall be run without interruption (finished the same day as started).

8. A duplicate test shall be independently run within three days. To check up on aging, it is very important that the date of both runs be recorded. Members of the Committee are requested to keep mounted samples for comparison at a meeting scheduled to follow tests.

Results of Tests:

IN determining the wash at which all traces of the stripe were removed the background and light reflection greatly influenced the readings. When mounted on black cardboard as instructed in the proposed method the results of the collaborators, who took part checked well. The majority of readings were between 4 and 5 washes and in most cases the workers checked themselves in both tests outlined. However, when the same cloth samples were placed on a white background and shaded from direct light outlines of the stripes could be seen up to 15-16 washes in cases where that many washes were made.

The following comments were taken from reports received by the chairman:

* * *

1. We have washed the soiled cloth in accordance with the instructions given in your letter of February 26.

2. Most of the soil is removed in the first wash. After four washes the soil may be said to be completely removed although under certain conditions of illumination streaks still can be made out. This is true however even after nine washes.

3. The streaks are easy to see when one knows where to expect them. An irregular pattern would be better than the present one.

4. These streaks appear to be attributable to a difference in the cloth where the soil was applied rather than to soil remaining in it.

* * *

When the samples were shuffled and viewed against the white background thru the hole in the black cardboard, shaded as you suggested, the marks could be identified on all the samples up to and including No. 15. No marks could be detected on No. 16 but a stripe was visible on No. 17.

This seems to indicate that a perfectly definite end point will be hard to arrive at, but

it may be that by increasing mechanical action, results more like those obtained by you in the commercial laundry can be secured and in this case the steps might be expected to be long enough so that the end point could be established with a satisfactory degree of concordance between different tests or different workers.

We shall await your further advices before doing additional work along this line, but suggest for your consideration the use of some sort of heavier ball and a greater number of them in each jar.

* * *

We encountered some difficulty in selecting the test piece which did not show any visible trace of the soil. We found it necessary to have a number of men make the selection, and took as a final result the conclusions reached by a majority. This conclusion was that the index of detergency in the work as conducted in our laboratory would be seven; that is, the seventh test piece was the first one which did not show any traces of the lines of soil.

* * *

TEST "A"—3/11/29: Looking at the darkest samples from Test "A," we find that after 3 washes a trace of the soil still remains but that practically nothing can be seen on the piece washed 4 times. In the case of the lighter samples from Test "A," nothing can be seen on the piece washed 3 times.

TEST "B"—3/14/29: Looking at the darkest samples we find a faint suggestion of soil remaining after 4 washes, while on comparing the lighter samples from this wash we find only a faint suggestion after 3 washes, and nothing after 4 washes.

TEST "C"—3/18/29: Looking at the darkest samples we find a trace still remains after 4 washes, and after 5 and 6 washes a suggestion of the line is still present if the cloth is examined extremely carefully. Looking at the lighter samples we find practically no soil left after 3 washes, and a mere suggestion after 4 washes, and nothing after 5 or 6 washes.

I am inclined to consider the results of this test unsatisfactory for the reason that the soil was too easily removed, most of it being removed in the first wash; and after the third wash only a trace remained. Furthermore, the soil is not evenly removed, that is, a piece washed in one jar may be a little lighter than a piece washed in another jar. This result may be due to unevenness in the printing of the soil on the cloth, or an unequal mechanical action in the jars. If all the soil washes out after three or four washes, it appears to us that the detergent efficiency of different soaps could not be graded closely enough to be of the practical value contemplated, especially if the same soap will, in one test, wash the fabric clean in four washes and in another test wash it clean in three washes. However, we understand that the main purpose of this series of tests is to determine whether the machine itself, that is the Launder-Ometer type, is a machine of satisfactory type to use in future work on detergency. We have used our Launder-Ometer considerably and while certain improvements are indicated, we feel that it is a satisfactory type of machine for future work on detergency —that is, until a better is devised. For example, the Launder-Ometer permits the running of 20 tests at once under identical conditions and this is a decided advantage.

The objections to the machine which we have noticed are as follows:

The sample piece shows a tendency to stick to the inside of the cover, allowing the balls to beat on it excessively, thus tending to produce uneven washing. This was especially noticeable when using soiled cotton sheeting and steel balls. The washed test pieces were so uneven that these particular tests had to be discarded. Rubber balls give a more even soil removal; also the thinner fabrics wash more evenly. When conducting tests at 150° F and over, it is difficult to keep the jars tight, that is, the solution tends to leak out of the jar. At 170°F, this leaking is very troublesome. At times we have found some jars entirely empty at the end of the wash, and other jars containing 300 or 400 cc of water starting with 100cc. This trouble occurs even when new rubber rings are used and the cover apparently clamped down tightly. The clips which hold the jars in place are easily bent out of shape and should be made stronger. The inside of the water bath of our Launder-Ometer is beginning to rust. We have little fault to find, on the whole, with the construction of the Launder-Ometer made by the Atlas Electric Devices Co. except as mentioned above.

* * *

The number of washes necessary in each case to remove the soil was four when test pieces were mounted on black cardboard and five when observed over a white background. There was a lack of uniformity in results between the two tests, e. g. one wash in test number one did not remove as much soil as in test number two and the same effect was observed after two washes. (In test number two the soil was more completely removed on the test piece which was washed twice then on the one that had had three washes.)

We have run the tests as nearly as possible under the conditions specified. Our temperatures probably did not vary from 150° F. by more than 2 degrees, but the speed of rotation of our machine, which was not purchased from the Atlas Co., but was made in our own shops, proved to be 59 R. P. M. This is, of course, higher than it should be but could not be remedied. Comparison with the results of other members will show whether this had any effect.

Our two tests, run on March 6 and 8 respectively, check each other very well, but we cannot say that we are optimistic over the prospect of differentiating between soaps by this procedure. It is difficult to decide just when the black stripe has been completely washed out. We should consider nine washes to be needed for complete whiteness but we fear that the personal element is considerable in this judgment, and that it will be precarious to judge between soaps A and B when with soap A alone it is so hard to tell whether six, eight, or ten washes are required for complete whiteness. Unfortunately we have little constructive criticism, other than to repeat our opinion that the degree of whiteness resulting from one or two washes is a better criterion of detergent power than is an attempt to determine the number of washes required for complete whiteness. We believe that a visual comparison of cloths washed once with each of two soaps would show the difference, if any, between the soaps better than would a comparison after nine or ten washes. We report nine washes as being needed for complete whiteness, and we shall be interested to hear the findings of other members.

* * *

As instructed in the direction for testing the proposed method of detergency, we cannot see any trace of the design on the 5th wash when the pieces are mounted on black cardboard and viewed in direct light. Our tests were run March 19th and 21st and both tests check at the 5th wash. However, when the samples are viewed against a white background thru a hole in black carboard and shaded from direct light, the stripes can be identified up to and including the 13th but cannot be seen on the 14th to 20th. Ten individuals read the same test pieces and it was found that those trained in judging laundry quality could detect traces that were not caught by the untrained and altho the readings of individuals differed it was found in all cases each individual was able to check himself on shuffled samples.

The tests have clearly shown that it is the very last traces of soil that are hardest to remove, and that the percentage of soil removed in the beginning has very little bearing on the final efficiency of a detergent and methods of laundering. So long as a trace of soil is discernible with the naked eye, the cloth cannot be considered clean. The degree of whiteness tells absolutely nothing about the effectiveness of the washing formula on the remaining soil, and since we are not interested in methods that almost clean soiled articles, we believe it is of very little value when used alone. We find a white background (such as a clean cuff) in shaded light shows up traces very well. We find one of the drawbacks of the machine is that it washes the soil from the surface but does not have sufficient mechanical action to be effective on soil between the fibres. In this respect, we find the laboratory machine less efficient than a laundry wheel, and suggest that steps be taken to overcome this difference. In direct light on a black background, the cloth may appear white, but still show traces when shaded on a white background. It is our opinion that the latter method is the better, and we should like the opinion of all the workers on this point. We have all learned a great deal about the Launder-Ometer, and perhaps an open discussion will furnish ideas by which it can be made more efficient. We believe that the abrasive load can be improved, because the smooth surfaced rubber spheres do not approach the abrasive rubbing action brought about by friction in laundering. Perhaps covering the individual spheres with cloth, using cloth covered Monel metal spheres, cubes, or increasing the number per jar will prove more satisfactory. The mechanical action in the tests is not uniform because the cloth floats in the solution. We found that this very undesirable feature can be eliminated by using the method of Rhodes & Brainard (Ind. & Eng. Chem. Vol. 1 Jan. 1929) in which the abrasive load is inserted in a small bag made of the standard soiled cloth. We find the double belt drive requires considerable regulating to maintain the specified R. P. M., and believe a chain or gear drive more serviceable. The speed in carrying out the tests could undoubtedly be improved if a hinged bar held each row of five jars in place with a single clamp or wing nut at one end. There are many things of this nature which we hope will be brought up in the proposed meeting after the tests, and it is hoped that the members will agree that the method can be made useful.

* * *

Discussion of Results

IT is evident from the results that the machine, as used, was found unsatisfactory

and the method of reading the index likewise because the end point was drawn out and the washing was not uniform.

Since practical laundry tests in standard washing machines give sharp end points and consistent results, the problem of producing a satisfactory laboratory machine must first be solved if progress is to be made on a laboratory scale. A satisfactory laboratory machine should be capable of removing all traces of soil in a reasonable length of time and its action should be such that it readily removes traces held between the fibres as well as impressions made in cloth at time of printing, if any. This year's work has clearly indicated that the very last traces of soil are hardest to remove and since the committee is working to establish a method for determining the detergency of soap products, it is interested in removing these last traces and not in a method that almost cleans soiled cloth. It has been suggested that mechanical action of the machine be increased by increasing the abrasive load (kind, size and number of balls) and also placing the balls in a bag made up of the standard cloth. It is evident that the method of reading the index can be made satisfactory on properly washed samples if observed under identical conditions. In this respect a white background in shaded light has proved the best so far suggested.

As a check up on the index, it has also been suggested that a substance be put in the soil composition that can easily be detected by chemical means directly on the cloth or in the ash of the cloth. Materials other than lampblack have also been proposed with the idea that a material which will wash out easier will make up for the deficiency of the machine. It has also been suggested that the degree of whiteness of the washed cloth be used along with the proposed index reading in order to account for any possible redeposition of soil. The chairman, as well as other members, believes that the proposed method of soiling and evaluating detergency has not yet been thoroughly tested and work along this line should be continued. The principle is sound and modifications in the composition of soil and method of reading should yield useful results in tests approximating commercial laundering. The machine used in this year's work makes simultaneously possible a series of tests under identical conditions and is undoubtedly the best so far presented. Mechanical improvements such as using metal shot abrasive in a bag made of the soil cloth and adopting square bodied corrugated jars are worthy of trial.

In view of past work and the complexes involved, it is evident that detergents should preferably be tested under conditions in which they are generally used. If laboratory equipment cannot be made a reduction to practice, surely, the standard washwheels of industry are accessible and offer an excellent field for this class of work. The chairman wishes to express his sincere appreciation to the members of the committee and their assistants for the large amount of time and work devoted to detergency problems in the past year.

L. T. HOWELLS, *Chairman*,
Detergents Sub-Committee
American Oil Chemists' Society.

Offer New Open-Head Drum

Republic Steel Package Co., Cleveland, is now offering a new type open or removable head light weight drum to producers of vegetable oils, fats, greases and allied products. The new drum, which is designed as a one time shipper, makes removal of fats, hardened oils, greases, etc., possible without the use of heat and, according to the makers, sells at a substantially lower price than heavier containers. It is available in 15, 30 and 55 gallon sizes. The company, of which F. E. Rennebaum is president, also makes standard I.C.C. removable head drums and steel pails in various sizes.

Brown-Edwards Co., well known New York brokers and commission merchants in all classes of oils and fats, have removed their offices from 2 Rector St. to 40 Rector St.

The offices of Frank Honicker, Executive Secretary of the Mayonnaise Products Manufacturers Association of America, Inc., are now located at 1500 Walnut Street, Philadelphia.

A position as Research Director or Technologist for an industry contemplating research and new development is solicited. The applicant has exceptional training and experience. Reply to Box D23, c/o Oil & Fat Industries.

Position Wanted—Man with 18 years' experience in the refining and bleaching of oils and in the manufacture of soaps. For further information, address M. A. W., P. O. Box 67, Milwaukee Junction Station, Detroit, Mich.

President Putland's Address

Retiring Executive Reviews Oil Chemists' Accomplishments During Year Just Past and Those Preceding

By A. W. PUTLAND

TODAY again finds us in this City on our annual pilgrimage, with our objective, the annual meeting of our Society of which it has been my privilege to act as President during the past year, the honor you bestowed on me last May. As it is customary for the President to review the various accomplishments of the Society during the twelve months of his service, I shall do so briefly, allowing the various committee chairmen to give you the complete gist of our many activities and the results.

One of the outstanding features of the work accomplished, in my opinion, was the result of that performed by your Referee Board through whose efforts there was inaugurated the practice of submitting samples to Referee Laboratories for analyses. This was made possible through the generosity of a member of the Referee Board in furnishing samples. This plan should unquestionably have been carried out in previous years, but a lack of finances prevented this. Such check samples are without question of great value to the industry by serving to immediately direct the attention of the Board to such laboratories whose results are out of line. The standing of the Referee Laboratories is also further strengthened by the practice. I feel that some permanent arrangement for the continuance of this practice should be provided by the Society. To promote a higher standard of ethics is one of the announced purposes of the Referee Board and of this Society. How far we have succeeded in the accomplishment of this purpose, is well known to all of us. We have done a great deal, but we must continue our efforts, not only to hold the ground we have gained, but to promote an even higher standard. It is of little use to promulgate a formal code of ethics having no power to punish breeches of such a code. Its effectiveness depends entirely upon it being a true expression of the standards of the individuals subscribing to the code. Accomplishment of the purpose must depend, and has depended, upon bringing to the individual a realization that standards of conduct in business do not differ from standards in private life. May I, therefore, urge that every member not only help to preserve our present standard, but help to bring about a higher degree of respect for our Code of Ethics.

For the second time the Society held a fall meeting in New York, which meeting from every standpoint was very successful. Probably the most visible outstanding result of this meeting was the organization of a Soap Section. This Section of the Society at this time numbers about 20 very active members and as you have no doubt read in the official publication, there has been distributed to members a sample of crude glycerine and a sample of soap as the beginning of a very ambitious cooperative analytical program. Encouragement of the activities of this section should be continued.

There was suggested, some few years ago, that our methods be printed in a book of loose leaf form and though there was considerable effort required to separate rule references and rewriting of the methods to a form that would permit publication, this work was completed during the past year, and all of our methods are now available in loose leaf form at a very reasonable price. The arrangement your Committee made with the publishers provides for keeping our methods up to date at very nominal cost.

The standardization of Lovibond glasses has progressed very satisfactorily under the direction of the National Bureau of Standards, and up to the present time there have been approximately eleven hundred glasses standardized. This number represents only glasses which have been submitted through the Society. It is hoped that this practice will be continued and that all glasses will be kept on a standard basis.

Our Journal is now being published by a very progressive firm of publishers. This

(*Turn to Page* 42)

Twelfth Exposition of Chemical Industries

Manufacturers of Equipment and Supplies in Friendly Competition Record Outstanding Progress

THE Twelfth Exposition of Chemical Industries, held at the Grand Central Palace, New York, during the week of May sixth, brought out the largest display ever held of modern machinery, equipment, supplies and containers for the chemical and allied industries. An outstanding feature of the exposition was the large number of new alloys, for corrosion resistance, exhibited. Among the many exhibits of particular interest to manufacturers and refiners of oils and fats and the manufactured products thereof we describe below a few as typical:

Mixing Equipment Co.—Showed Lightning electrical portable mixers of all types, monel metal tanks and pure nickel kettles. Also side-angle, propeller tank mixers for tanks of any size. The product featured was a newly developed, totally enclosed, self ventilating type of vapor proof motor for mixing inflammable liquids. Exhibit in charge of F. L. Craddock, C. H. King, James J. O'Shea, F. L. Bate, C. J. Donovan and M. L. Kirkland.

T. Shriver & Co.—Showed a miniature filter press and a diaphragm pump. Exhibit in charge of R. E. Perry and J. H. Clark, Jr.

Pressed Steel Tank Co.—Showed Hackney removable-head barrels, drums, tanks, cylinders, etc. Exhibit in charge of H. Merker, P. T. Babcock and N. L. Nelson.

Burt Machine Co.—Showed the Burt labeling machine. Exhibit in charge of C. Wyld.

Emery Industries, Inc.—Showed samples of candles of various compositions, as well as several grades of red oil, stearic acid, "H" Fatty Acids, stearine pitch and saponification crude glycerin. Also typical commercial packages for above. Exhibit in charge of H. D. Armitage, J. A. Springer and John B. Bolton.

Foxboro Co.—Showed its Duplex temperature recorder controller for controlling water and steam to chromium plating tanks. Also the new integrating and recording steam flow meter. Exhibit in charge of Stanley Laird and Kenneth Barton.

Empire Metal Cap Co.—Showed screw caps with various types of liners for use in the packaging of chemicals, cosmetics and prescriptions in bottles and jars. Exhibit in charge of A. L. Merolle and Thomas Poley.

Vasel Grinding Mills—Showed their new self-contained, hydraulic-controlled, three roller mill. It is gear driven on both sides, and has easily removed side plates for quick cleaning. Made by Taylor-Wharton Iron & Steel Co., Easton, Pa., makers of iron and steel since 1742. Exhibit in charge of G. A. Vasel.

Premier Mill Corp.—Showed four of its mills for grinding liquids and pastes. Exhibit in charge of B. M. Nestor, U. K. Nestor, and W. A. McLean.

Fred S. Carver Co.—Showed six hydraulic presses and miscellaneous apparatus, illustrating the various uses of the Carver press in crushing, plastic molding, cake forming, pressing of oils and liquids, fat pressing and oil splitting. Exhibit in charge of R. H. Simpson, H. H. Brown and Fred S. Carver.

Philadelphia Quartz Co.—Showed samples of silicate of soda in solid and liquid form. Also chart showing silicate of soda tree. Exhibit in charge of W. H. Buxton, Jr., James G. Vail, Dr. William Sterricker, J. W. Wichterman and E. A. Russell.

Carpenter Container Corporation—Exhibit featured a new grease drum of fiber material treated on the inside to make it tight for greases. The drum has one-piece heads of wood. One drum of the type taken to the Antarctic as a lanolin container by Commander Byrd was displayed. Another new feature of this drum is its suitability for direct printing on the side of the container, in black or multicolor work, thus extending to the large bulk package the advantages of label advertising previously limited to small containers. H. L. Carpenter, Henry Craemer, W. F. Hoffman, Warren M. Silsbe and G. E. Riches were in attendance for the Carpenter Container Corporation.

Turbo Mixer Corp.—Showed equipment for the dissolving of crystaline salts and for all mixing operations. Including a 10 gal. mixer of monel metal and a change can mixer for portable cans from 30 gals. to 200 gals. Exhibit in charge of Gordon MacLean, K. S. Valentine, H. S. Beers and W. H. Crafts.

Pneumatic Scale Corp.—Showed automatic filling, weighing, sealing and capping machinery.

Oil Tariff Rates Mostly Unchanged

Hawley-Smoot Tariff Bill as Reported Out Mostly Same Rates as 1922 Tariff—Linseed Oil Rate Up—Soya Bean Rate Doubled—Coconut Rates Unchanged—Philippine Oil Still Free.

EERY little change in the present tariff rates on oils and fats and other soap making raw materials were proposed in the new Hawley-Smoot Tariff Bill as reported out of committee on May 7. Mostly all oils and fats carry the old duty rates. Soya bean oil and linseed oils are exceptions, the rate on the former having been doubled to five cents per pound and on linseed having been raised from 3.3c to 4.16c per pound. Coconut oil and copra which have been a bone of contention in the hearings before the Ways and Means Committee, both remain as before. Copra is free and coconut oil carries two cents per pound, except Philippine oil which is free of duty. Glycerin duties and the duties on various soaps and soap products are the same as in the 1922 schedule.

The new proposed rates, compared with the rates which have been in effect since 1922, are given through the courtesy of the Bureau of Raw Materials for American Vegetable Oils and Fats Industries in the following table:

	Present Tariff	Proposed Tariff
Par. 1:	Per Lb.	Per Lb.
Red Oil or Oleic Acid	1½c	1½c
Stearic Acid	1½c	1½c
Par. 43:		
Glycerin—crude	1c	1c
Glycerin—refined	2c	2c
Par. 53—Animal or Fish Oils:	Per Gal.	Per Gal.
Sod	5c	5c
Herring	5c	5c
Menhaden	5c	5c
Whale	6c	6c
Seal	6c	6c
Sperm (crude)	10c	10c
All fish oils not specially provided for	20% ad val.	20% ad val.
Wool grease — crude — over 2% f. f. a.	Per Lb. ½c	Per Lb. 1c
Brown wool grease	½c	..
Wool grease—medicinal	1c	3c
All other animal oils, fats, and greases not specially provided for	20% ad val.	20% ad val.
Par. 54—Expressed or Extracted Oils:	Per Lb.	Per Lb.
Castor	3c	3c
Hempseed	1.5c	1.5c
Linseed	3.3c	4.16c
Olive (container less than 40 lbs.)	7.5c	7.5c
Olive—not specially provided	6.5c	6.5c
Poppyseed	2c	2c
Rapeseed	6c per gal.	6c per gal.
All other expressed or extracted oils not specially provided for	20% ad val.	20% ad val.
Par. 55:	Per Lb.	Per Lb.
Cocoanut Oil	2c	2c
Cottonseed Oil	3c	3c
Peanut Oil	4c	4c
Soya bean Oil	2.5c	5c
Cocoanut Oil (Philippines)	Free	Free
Par. 56—Alizarin Assistant, Turkey Red Oil, Sulphonated Castor, other Sulphonated animal or vegetable oils, Castor oil soaps, all soluble greases: All the above in any form whatever and not specially provided for	35% ad val.	35% ad val.
Par. 57:		
Hydrogenated or Hardened Oils and fats	4c per lb.	4c per lb.
Other oils and fats, composition and properties of which have been changed by processing and not specially provided for	Ad Valorem 20%	Ad Valorem 20%
Par. 58: Oils, Combinations and Mixtures, Animal, Vegetable or Mineral, but not less than rate applicable to material subject highest duty.	25%	25%
Par. 701:	Per Lb.	Per Lb.
Tallow	½c	½c
Oleo Oil	1c	1c
Oleo Stearine	1c	1c
Par. 703:		
Lard	1c	3c
Lard compounds and substitutes.	4c	5c
Par. 709:		
Butter	12c	12c
Oleomargarine and Butter Sub...	8c	12c
Par. 760—Oil Bearing Seeds:		
Castor Beans	½c	½c
Flaxseed (bu. of 56 lbs.)	40c per bu.	56c per bu. (56 lbs.)
Poppy seed	32c per 100 lbs.	32c per 100 lbs.
	Per Lb.	Per Lb.
Sunflower seed	2c	2c
Soya bean	½c	2c
Cottonseed	½c	½c
Par. 1626—Oil bearing nuts and seed:		
Copra	Free	Free
Hempseed, Palm nuts, Palm nut kernels, Tung nuts, Rapeseed, Perilla, Sesame, and nuts not specially provided for—when the oils derived therefrom are free of duty	Free	Free
Par. 1629:		
Oil Cake and Oil Cake Meal....	Free	Free
Par. 1630:		
Spermaceti	....	6c per lb.
Whale (from American fisheries)	....	Free
Cod Oil	....	Free
Cod liver oil	....	Free
Par. 1632:		
Croton Oil	Free	Free
Palm Oil	Free	Free
Palm Kernel Oil (denatured)..	Free	Free
Undenatured	Free	1c per lb.
Perilla Oil	Free	Free
Sesame Oil	Free	3c per lb.
Sweet Almond Oil	Free	Free
Olive Oil—rendered unfit as food	Free	Free
Sulfur Olive Oil	Free	Free
Chinese Tung Oil	Free	Free
Nut Oils not specially provided for	Free	Free
Par. 1688:		
Rosin	Free	Free
Par. 1691:		
Vegetable Tallow	Free	Free
MISCELLANEOUS ITEMS		
Par. 71:		
Bone black or bone char and blood char	20%	20%
Decolorizing and deodorizing Carbons	20%	20%
Par. 206:	Per Lb.	Per Lb.
Pumice stone $15 per ton or less	.1c	.1c
Valued at more than $15 per ton	.25c	.25c
Wholly or partly manufactured..	.55c	.55c
Par. 207:	Per Ton	Per Ton
Fullers Earth unmanufactured..	$1.50	$1.50
Wrought or manufactured	3.25	3.25

(*Turn to Page* 43)

Fat and Oil Data for First Quarter 1929

Production, Consumption Exports and Imports with Factory and Warehouse Stocks March 31, 1929

THE Department of Commerce announces that the factory production of fats and oils (exclusive of refined oil and derivatives) during the three-month period ended March 31, 1929, was as follows: Vegetable oils, 884,021,721 pounds; fish oils, 19,920,596 pounds; animal fats, 656,500,156 pounds; and greases, 100,606,316 pounds; a total of 1,661,048,789 pounds. Of the several kinds of fats and oils covered by this inquiry, the greatest production, 536,920,852 pounds appears for lard. Next in order is cottonseed oil with 522,824,575 pounds; linseed oil with 200,122,722 pounds; tallow with 118,340,413 pounds; coconut oil with 90,175,368 pounds, and corn oil with 36,350,888 pounds.

The production of refined oils during the period was as follows: Cottonseed, 500,415,614 pounds; coconut, 83,755,347 pounds; peanut, 3,381,316 pounds; corn, 36,317,998 pounds; soya-bean, 2,367,175 pounds; and palm-kernel, 3,985,123 pounds. The quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

The data for the factory production, factory consumption, imports, exports, and factory and warehouse stocks of fats and oils and for the raw materials used in the production of vegetable oils for the three-month period appear in the following statements:

(In some cases, where products were made by a continuous process, the intermediate products were not reported.)

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS

KIND	Factory operations for the quarter ended Mar. 31, 1929		Factory and Ware'se stocks
	Production (pounds)	Consumption (pounds)	Mar. 31, 1929 (pounds)
VEGETABLE OILS: [1]			
Cottonseed, crude	522,824,575	544,134,745	106,954,831
Cottonseed, refined	500,415,614	303,618,393	584,978,238
Peanut, virgin and crude	4,462,713	4,078,642	1,814,304
Peanut, refined	3,381,316	2,503,682	1,581,786
Coconut, or copra, crude	90,175,368	162,062,793	116,267,405
Coconut, or copra, refined	83,755,347	75,542,900	14,493,772
Corn, crude	36,350,888	43,786,840	12,496,670
Corn, refined	36,317,998	9,179,749	11,791,087
Soya-bean, crude	3,082,740	6,400,730	8,228,961
Soya-bean, refined	2,367,175	1,094,027	1,420,293
Olive, edible	583,081	353,434	4,940,142
Olive, inedible	12,925	1,515,936	1,567,953
Sulphur oil, or olive foots	—	9,852,216	6,019,096
Palm-kernel, crude	—	10,822,998	18,491,038
Palm-kernel, refined	3,985,123	3,669,525	905,753
Rapeseed	—	3,417,688	3,263,270
Linseed	200,122,772	121,575,007	181,438,594
Chinese wood or tung	—	23,296,823	24,595,764
Chinese vegetable tallow	—	882,704	601,248
Castor	24,125,847	8,621,218	7,872,008
Palm	—	43,096,864	28,716,498
All other	2,280,812	2,467,751	2,817,701
FISH OILS: [1]			
Cod and cod-liver	225,425	3,535,850	7,343,068
Menhaden	—	8,129,492	8,848,125
Whale	—	17,594,279	20,768,169
Herring, including sardine	19,605,855	16,563,169	29,106,133
Sperm	—	192,082	3,038,869
All other, (including marine animal)	89,316	227,146	527,175
ANIMAL FATS:			
Lard, neutral	14,167,597	6,502,263	6,867,810
Lard, other edible	522,753,255	3,235,831	137,148,503
Tallow, edible	11,243,771	7,068,551	3,910,667
Tallow, inedible	107,096,642	126,807,740	92,844,155
Neat's-foot oil	1,238,891	1,537,024	1,446,827

[1] The data of oils produced, consumed, and on hand by fish oil producers and fish canners were collected by the Bureau of Fisheries.

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS (Continued)

KIND	Factory operations for the quarter ended Mar. 31, 1929 Production (pounds)	Consumption (pounds)	Factory and Ware'se stocks Mar. 31, 1929 (pounds)
GREASES:			
White	22,932,816	11,049,826	8,514,513
Yellow	20,153,454	13,265,343	9,265,217
Brown	12,126,557	10,494,433	5,711,854
Bone	5,464,500	16,254	1,722,117
Tankage	12,728,181	379,144	2,498,530
Garbage or house	22,109,308	19,041,097	5,750,785
Wool	1,809,232	1,720,772	3,100,368
Recovered	594,858	832,258	586,390
All other	2,687,410	1,159,868	1,923,933
OTHER PRODUCTS:			
Lard compounds and other lard substitutes	279,574,949	103,456	27,817,587
Hydrogenated oils	158,178,245	149,950,968	14,516,706
Stearin, vegetable	3,822,384	5,419,084	2,786,018
Stearin, animal, edible	14,841,864	10,719,468	6,056,056
Stearin, animal, inedible	5,245,951	8,710,959	2,945,708
Oleo oil	30,591,545	12,739,721	12,013,102
Lard oil	7,620,541	4,396,924	4,047,368
Tallow oil	2,496,020	2,000,041	2,118,567
Fatty acids	40,840,508	43,690,725	6,876,664
Fatty acids, distilled	10,773,322	7,621,014	2,357,558
Red oil	16,241,271	7,122,927	8,536,321
Stearic acid	11,657,595	2,568,407	4,371,146
Glycerin, crude 80% basis	36,603,729	39,664,503	18,393,056
Glycerin, dynamite	14,177,795	5,812,725	12,567,955
Glycerin, chemically pure	17,720,507	2,485,894	10,022,450
Cottonseed foots, 50% basic	83,780,438	79,046,285	34,178,416
Cottonseed foots, distilled	35,411,050	33,929,932	7,365,744
Other vegetable oil foots	18,663,525	15,460,030	2,676,145
Other vegetable oil foots, distilled	571,942	549,547	378,255
Acidulated soap stock	20,527,814	17,155,951	16,057,243
Miscellaneous soap stock	26,142	91,881	269,329

RAW MATERIALS USED IN THE MANUFACTURE OF VEGETABLE OILS

KIND	Tons of 2000 pounds Consumed Jan. 1 to Mar. 31	On hand Mar. 31	KIND	Tons of 2000 pounds Consumed Jan. 1 to Mar. 31	On hand Mar. 31
Cottonseed	1,626,941	386,986	Flaxseed	300,249	127,230
Peanuts, hulled	5,775	781	Castor beans	27,118	4,635
Peanuts, in the hull	1,135	170	Mustard seed	251	1,396
Copra	71,097	24,671	Soya-beans	10,595	346
Coconuts and skins	547	46	Olives	1,904	12
Corn germs	60,266	243	Other kinds	2,714	3,736

KIND	Tons	KIND	Tons
Castor beans	25,165	Poppy seed	1,027
Copra	78,483	Perilla and sesame seed	3,301
Flaxseed	189,764	Other oil seeds	5,168

IMPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED MARCH 31, 1929

KIND	Pounds	KIND	Pounds
Animal oils & fats, edible	569,998	Palm-kernel oil	12,148,722
Whale oil	412,163	Sesame oil	4,117,390
Cod oil	2,921,130	Vegetable tallow	1,528,940
Cod-liver oil	5,247,338	Vegetable wax	1,378,245
Other fish oils	6,830,085	Carnauba wax	1,854,750
Tallow	9,463,871	Peanut oil	475,813
Wool grease	2,763,801	Rape (colza) oil	3,634,478
Grease and oils, n.e.s. (value)	253,778	Linseed oil	215,722
Olive oil, edible	20,191,529	Soya-bean oil	5,235,639
Tung oils	26,185,604	Perilla oil	1,588,419
Coconut oil	101,270,097	Other expressed oils	5.811.190
Sulphur oil or olive foots	9,921,967	Glycerin, crude	5.181.724
Other olive oil, inedible	3,119,735	Glycerin, refined	1,959,862
Palm oil	57,586,025		

(*Turn to Page* 42)

Market Report on

FATS, OILS AND GREASES

(As of May 27, 1929)

NEW YORK—The downward movement in the prices of oils, fats and greases continued throughout the recent period. A seasonal weakness was apparent in almost all items as consumers started to curtail purchases in anticipation of decreased production during the summer months. Buyers held off, despite falling prices, apparently anxious to buy at the bottom of the falling price curve. The report of the action of Congress on the proposed tariff gave additional impetus to the drop, it being probable that duties will not be increased as domestic producers had hoped. Coconut oil was lower again. Cottonseed oil declined to a new low figure for the season. Lard finally weakened and was quoted lower, as were all the greases. Red oil, stearic acid, olive oil, olive oil foots, palm oil and palm kernel oil were all slightly lower. Tallow and lard oil declined with the rest of the market. Linseed oil showed the only appreciable firmness, by advancing several points.

Coconut Oil

Tariff reports gave no indication that coconut oil or copra would pay a higher duty, relieving the minds of consumers as to future supplies of this material. This information combined with the seasonal weakness of the market to send prices down again. All grades were quoted lower, with copra also lower at 4¼c to 4⅜c lb.

Corn Oil

No changes were reported in the price of corn oil which has declined regularly throughout the last few months. Tanks were offered at 8⅛c to 8¼c lb., with bbls. at 10¾c. The fatty acid did decline due to weakness in competing materials, and was quoted at 10c to 10¼c lb.

Cottonseed Oil

A new low level for the season was set when crude cottonseed oil was reported at 7¾c to 8c lb., with P. S. Y. at 9½c to 10c lb. The recent break in the securities markets discouraged speculation in cottonseed oil, leading to a decline there. Later in the period the market firmed up somewhat, owing to unfavorable weather reports from the South.

Fish Oils

The market for these oils was steady, with routine business the general order. Stocks were short as is usual at this time of the year. Quotations on the crude oils were nominal in most cases.

Grease

Prices on all greases were slightly lower, in harmony with the rest of the market. Quotations at the close were: white, 7½c to 9½c lb.,; yellow and house, 6⅞c to 7c; brown, 6¾c to 6⅞c.

Lard

After holding firm for some time in the face of a generally declining market, lard finally weakened and dropped to 11½c lb. for city tierces. The compound was offered at the same figure. Western tierces brought 12c lb., with neutral tierces at 13¼c lb.

Linseed Oil

As consumption started its usual seasonal increase, quotations on linseed oil advanced. Raw oil in cars was quoted at 10 3/10c lb., with boiled oil in tanks also higher at 9 9/10c. Refined linseed oil in bbls. was offered at 11c to 11⅕c lb. Cake was slightly lower again at $42.50 ton, with meal at $50.00 ton.

Olive Oil and Olive Oil Foots

Olive oil followed the rest of the market in declining to $1.20 to $1.25 gal. for commercial oil. Foots were also lower at 10c to 10¼c lb. With a fair demand and shorter offerings, the market firmed up somewhat toward the close.

Red Oil and Stearic Acid

As the price of the raw materials for the manufacture of red oil continued to decline, the period saw another drop in quotations on this item. Distilled or saponified red oil was quoted at 10⅜c to 10⅞c lb. in bbls., and at 9½c lb. in tanks. Stearic acid also continued downward, and at the close double pressed was offered at 15¼c to 15¾c lb., with triple pressed at 17¾c to 18¾c.

Palm and Palm Kernel Oil

The general weakness in the market affected palm oil, causing a decline to 8c lb. in the price of spot Lagos, while Niger oil was quoted at 7¾c. Kernel oil in packages brought 8¼c to 8½c lb.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of			
40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing			
36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing			
36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¾	.14
No. 3, bbls.	lb.	.13¼	.13½
Chinawood, bbls. or drs.	lb.	.14½	.14¾
Coast, tanks, spot	lb.	.13¼	.13⅜
Futures	lb.	.13¼	.13⅜
Coconut, Ceylon grade, bbls.	lb.	.07⅞	.08
Coast, tanks	lb.	.06¾	—
Cochin grade, bbls.	lb.	.08	—
Manila, bbls.	lb.	.07⅞	.08
Tanks, N. Y.	lb.	.07⅛	—
Coast tanks	lb.	.06¾	—
Fatty acids, mill, tanks	lb.	.10½	.10¾
Cod, Newfoundland, bbls.	gal.	.63	.64
Copra, bags, Coast	lb.	.04¼	.04⅜
Corn, tank, mills	lb.	08⅛	.08¼
Bbls., New York	lb.	.10¾	—
Refined, bbls.	lb.	.11¾	—
Fatty acid	lb.	.10	.10¼
Cottonseed, crude, tanks, mill	lb.	.07¾	.08
P. S. Y.	lb.	.09½	.10
Fatty acids, mill, bbls.	lb.	.10½	.10¾
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03½	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbls. N. Y.	lb.	.07½	.09½
Yellow	lb.	.06⅞	.07
Brown	lb.	.06¾	.06⅞
House	lb.	.06⅞	.07
Bone Naphtha	lb.	—	.06⅞
Herring, coast tanks	gal.	.40	.42
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.11½	—
Compound, tierces	lb.	.11½	11¾
Middle Western, tierces	lb.	—	.12
Neutral, tierces	lb.	—	.13¼
Prime Western, tierces	lb.	.12	—
Lard oil, No. 1, bbls.	lb.	.12¼	—
No. 2, bbls.	lb.	.12	—
Extra, bbls.	lb.	.13	—
No. 1, bbls.	lb.	.12½	—
Winter strained, bbls.	lb.	.13¼	—
Prime, bbls.	lb.	.15¼	—
Linseed Oil, boiled, tanks	lb.	.0990	—
Car lots, bbls.	lb.	.1070	—
Less car lots, bbls.	lb.	.1110	—
Less than 5 bbls.	lb.	.1150	—
Double boiled, less than five bbls.	lb.	.1180	.1210
Raw, tanks	lb.	.0950	—
Car lots, bbls.	lb.	.1030	—
Less car lots, bbls.	lb.	.1070	—
Less than 5 bbls.	lb.	.1110	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1100	.1140
Varnish grades, bbls.	lb.	.1120	.1160
Linseed cake, bags	ton	—	42.50
Meal, bags	ton	50.00	—
Menhaden, crude, tanks, Baltimore	gal.	—	Nom.
Light pressed, bbls.	gal.	.71	.73
Yellow bleached, bbls.	gal.	.73	.75
White bleached, bbls.	gal.	.76	.78
Mustard, bbls.	gal.	.95	—
Neatsfoot, cold pressed, bbls.	lb.	.18¾	—
Extra, bbls.	lb.	.12¾	—
No. 1, bbls.	lb.	.12½	—
Pure, bbls.	lb.	.14¾	—
Oleo, No. 1, bbls.	lb.	.11	.11½
No. 2, bbls.	lb.	.10½	.10¾
No. 3, bbls.	lb.	.10¼	.10½
Olive, denatured, bbls. N. Y.	gal.	1.20	1.25
Shipments	gal.	1.18	1.19
Foots, bbls.	lb.	.10	.10¼
Shipments	lb.	.10	.10⅛
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, cakes spot	lb.	.08	—
Shipments	lb.	.07⅜	—
Niger, casks, spot	lb.	.07¼	—
Shipments	lb.	.07¼	—
Palm Kernel, pkgs.	lb.	.08¼	.08½
Tank cars	lb.	—	.07¾
Peanut, crude, bbls.	lb.	.11½	—
Mills, tanks	lb.	.08½	.09
Refined, bbls.	lb.	.84	.85
Perilla, bbls.	lb.	.13½	Nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.04	1.06
Refined, bbls.	lb.	.85	.86
Red Oil, distilled, bbls.	lb.	.10⅜	.10⅞
Tanks	lb.	.09½	—
Saponified, bbls.	lb.	.10⅜	.10⅞
Tanks	lb.	.09½	—
Salmon, coast, tanks	gal.	.44	.45
Sardine, coast, tanks	gal.	.45	.47
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.11¾	.12
Orient, coast tanks	lb.	.08¾	.09
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15¼	.15¾
Triple pressed, bags	lb.	.17¾	.18¾
Stearine oleo, bbls.	lb.	.10	.10¼
Tallow, edible, bbls.	lb.	.08⅜	.08⅞
City extra, works, loose	lb.	.07½	—
Special, works, loose	lb.	.07¼	—
Tallow oil, acidless, bbls.	lb.	.11¼	—
Tanks, N. Y.	lb.	.11	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

President's Address

(*From Page* 31)

connection I feel is the best we have heretofore enjoyed. Since the present publishers have been successful with other publications, I have every reason to believe they will be successful with our Journal.

This present annual meeting is the twentieth of our Society, it having been organized in 1909; and to the charter members, most of whom have served the Society as its President, the industry is indebted. The heights which the Society has attained; the respect and prestige we command and the successful analytical cooperative programs conducted are a monument to their foresight, wisdom and perseverance. After these twenty years of efforts, I believe most of our methods have been developed to a very satisfactory point. However, most of our work has been devoted to the development of methods of primary necessity to the production end of the industry and since our man-power will be released from work of this nature may I strongly urge that it be employed in:

1. Developing methods of analysis useful and necessary to the consuming industries of oils and fats. Probably through cooperation with organized associations of the various consuming industries.

2. On problems of purely fundamental nature. This phase of one of the announced purposes of our Secretary has been neglected.

In conclusion, I extend my heartiest thanks to the members and my fellow-officers, for their cooperation, and also wish to assure you that the honor of having served as your President has been a source of great pride to me and that I shall always hold myself ready to serve the interests of the Society in the future as in the past.

It is now my pleasure to ask the various Committee Chairmen to present their reports, which I feel will be found interesting, as the past year has been a most active one as you will learn from the reports submitted.

New Books

THE Mellon Institute of Industrial Research of the University of Pittsburgh has issued a booklet entitled "Science for the Home Manager," containing a collected series of radio talks which were broadcast during the past winter from the University Radio Studio, under the auspices of Mellon Institute. In announcing this booklet, L. W. Bass, Executive Assistant of the Institute, states:

"The talks were selected with the view of giving a general idea of the recent developments in household economics resulting from the application of the scientific method to domestic problems. Each talk was delivered by a recognized specialist in the particular field which he covers. The preparation of this series was prompted by one of our guiding principles, namely, the dissemination of scientific information which may be applied in daily life."

Fat & Oil Data

(*From Page* 37)

EXPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED MARCH 31, 1929

KIND	Pounds	KIND	Pounds
Fish oils	5,620	Palm & palm-kernel oil	708,875
Other animal oils & fats, inedible	11,868	Peanut oil	3,832
Olive oil, edible	51,550	Soya-bean oil	64,870
Tung oils	1,704,174	Other expressed oils & fats	66,998
Coconut oil	134,936	Vegetable wax	151,889

EXPORTS OF DOMESTIC FATS AND OILS, QUARTER ENDED MARCH 31, 1929

KIND	Pounds	KIND	Pounds
Oleo oil	16,808,173	Other animal greases & fats	14,808,385
Oleo stock	1,534,362	Cottonseed oil, crude	6,121,084
Tallow	542,327	Cottonseed oil, refined	2,305,350
Lard	226,632,435	Corn oil	88,100
Lard, neutral	6,270,736	Vegetable oil lard compounds	1,426,360
Lard compounds, containing animal fats	956,858	Other edible vegetable oils and fats	818,263
Oleo & lard stearin	929,275	Coconut oil	4,961,349
Neat's-foot oil	388,700	Linseed oil	552,394
Other animal oils, inedible	252,277	Soya-bean oil	1,731,254
Fish oils	272,901	Vegetable soap stock	2,447,383
Grease stearin	222,305	Other expressed oils and fats, inedible	1,695,175
Oleic acid, or red oil	1,018,200	Glycerin	546,619
Stearic acid	398,048		

Notes of the Industry

Mayonnaise Questionnaire

THE Foodstuffs Division of the Bureau of Foreign and Domestic Commerce, Department of Commerce, at the request of the Mayonnaise Products Manufactured Association has mailed a questionnaire to all known manufacturers of mayonnaise and products thereof. The purpose of the questionnaire is to facilitate the compilation of the first census of production volume which has been attempted in this industry. The Department of Commerce urges all manufacturers of mayonnaise and allied products to return these questionnaires to the Department promptly.

Any manufacturer of these products who failed to receive a copy of the questionnaire may obtain one by addressing R. S. Hollingshead, Chief, Foodstuffs Division, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C.

Announcement has been made by the Continental Can Co., Inc., of acquisition by the company of MacDonald Machine Co., of Chicago, manufacturers of can-making machinery. This acquisition further rounds out the business of the Continental Can Co., and in conjunction with present properties owned by the company, provides it with facilities for manufacturing a complete line of can-making machinery.

Davidson Commission Co., recently moved its offices from 140 West Van Buren St., Chicago, to 175 West Jackson Blvd., Room 735A. The new telephone is Wabash 2604-2608.

B. H. Thurman, formerly Vice-president of the Best Foods, Inc., is now associated with the National Biscuit Company, at the New York Office, 85 Ninth Avenue.

(*Continued from Page* 35)

According to a last minute report from Washington, oil and fat schedules contained in the original tariff bill, as reported in the May issue of Oil & Fat, remained unchanged in the bill as it passed the House of Representatives on May 28. The vote in favor of the bill was 264 to 147. Although over 100 amendments were contained in the final measure, none affected the oil and fat schedules. Flaxseed duties were raised 7c to 63c a bushel, with linseed oil unchanged.

Aspegren's Offices Removed

ASPEGREN & COMPANY have removed their executive and sales offices to 205 East 42nd Street (Chanin Building), but will retain smaller space in the Produce Exchange Building for continuing the conduct of their cottonseed oil futures business.

The Pressed Steel Tank Company of Milwaukee has purchased the assets of the Seamless Steel Products Corporation, also located in Milwaukee. The Seamless Steel Products Corporation manufacture cylinders, tanks, Kantainers, and other seamless steel products. The business will be operated by the Pressed Steel Tank Company as a wholly-owned subsidiary. The change in ownership of the Seamless Steel Products Corporation will take place immediately. There will be no change in the personnel of either organization for the present.

Henry F. Williamson, formerly manager of the Edible Products Department of The Colgate-Palmolive-Peet Company, is now Pacific Coast manager for the Glidden Food Products Company, with headquarters at San Francisco.

The Portland, Oregon, plant of the Colgate-Palmolive-Peet Company, in which copra crushing and coconut oil refining are the major operations, has been sold to the Glidden Food Products Co., according to a report recently received in this office.

The Globe Fico Manufacturing Co. has been incorporated at El Paso, Tex., with a capital stock of one-million dollars, to consolidate in one concern the Globe-El Paso Cotton Oil Co., the El Paso Grain & Milling Co. and the Globe Ice & Cold Storage Co. Will E. Keller of Los Angeles, will be president of the new corporation, and Oscar J. Allen and L. D. McComus vice-presidents, in charge of operations at El Paso. Mr. Keller is the president of the Globe Oil Mills in Los Angeles.

Archer-Daniels-Midland Co. reports for the six months ended March 2, profit of $640,638 after depreciation and federal taxes, equal after preferred dividends to $1.03 on 480,852 common shares against $827,317, or $3.38 on 200,000 shares in the 1928 quarter.

OIL & FAT INDUSTRIES

The Editor's Page

A National Association

THE Interstate Cottonseed Crushers Association and the Texas Cottonseed Crushers Association have taken most of the steps necessary for a combination of the two bodies, and will hold a joint meeting this month for the formation of The National Cottonseed Products Association, which is designed to include all crushers and refiners of cottonseed oil and all manufacturers of and brokers in cottonseed products, from hulls and linters to salad oil and shortening. This is a splendid step in the right direction and should have the support of all interested in the progress of American oil and fat industries.

The move will not be complete, however, until the growth of industries crushing other oil-bearing materials than cottonseed, and manufacturing developed products thereof, is fully recognized by the association. The corn oil production of the Middle West, the coconut crushing of the Pacific Coast and the linseed industry of the Atlantic Seaboard and Middle West should all be encouraged to join the cottonseed crushing interests for mutual benefit and protection. The cultivation of soya beans for oil is growing by leaps and bounds in this country and it will be a matter of only a few short years before the production of tung oil in Florida will have an important place in the country's economy.

Bearing in mind all these facts, the present is the time that those who are guiding the destinies of the great cottonseed associations, should strive to make their amalgamation truly National in scope, by inviting the membership of these other vegetable oil producers and refiners. To this end, we suggest as more appropriate names, *"The National Seed Oils and Products Association"* or *"The National Vegetable Oils and Products Association."*

Progress and Obsolescence

THE management of the most outstandingly successful edible oil and products businesses at present active in this country has adopted the rule of carrying all physical equipment of its various factories and distributing plants on the company's books at the valuation of just *one dollar*. This may possibly be construed as an instance of developing the idea of making ample depreciation charges beyond the point of reason. This particular organization, however, is thereby placed in the most favorable position possible to enable it to take advantage of new discoveries and inventions in the technique of its line.

Progress in the reduction of producing costs and the improvement of quality of products is undoubtedly greatly furthered by such a policy. Those plants, on the other hand, which are deterred from the adoption of new equipment and methods because of the strain which would be placed upon their balance sheets by the junking of a large value in undepreciated or inadequately depreciated equipment, are bound to eventually become marginal producers, for the advanced methods will be inevitably adopted by some competitor, either one already in the field, or a new one, entering without the handicap of a large investment in superseded plant.

Many examples of such a situation may be gleaned from a study of the chemical and allied industries. One of outstanding notes is evidenced by the inability of the wood distillation industry to compete on favorable terms in the production of wood alcohol with the synthetic methanol process. The petroleum refining industry a few years ago was called upon to discard all its old standard distillation equipment and practice in favor of the pressure-still cracking process. This constant obsolescence of old methods and machinery by the discovery of improvements and advancements has been the very epitome of America's progress and will continue to play an ever enlarging role in the future. The law is effective even as between Nations, as will be readily recalled by those who remember the fate of the Indian indigo crop, after the perfection of synthetic indigo.

The fatty oil and soap industries in the United States at this moment are facing a situation which is full of possibility of making many million dollars worth of equipment valueless almost overnight. European chemists have developed several new processes to the point where they at least threaten the stability of our plant investments. The fermentation process for the production of glycerin has not yet been proven cheaper than the concentration and purification of soap lyes, but it has ad-

vanced sufficiently at least to demand extreme watchfulness on the part of all American producers of soap-lye or saponification glycerin.

In Europe certain oils are never expressed from the seeds in which they are developed, but are always obtained by solvent extraction, the soya bean oil being an outstanding example. Solvent extraction methods are being developed with rapidity, and new solvents are appearing on the market with increasing frequency. It is to be hoped that American operators of crushing mills for all kinds of oil-bearing materials will not fail to see to it that their depreciation charges on their plant equipment keep pace; not only with the age of their equipment, but with the collateral progress of invention as well.

Mart Smith Protests Wood Oil Tariff

IN A LETTER to the consumers of China wood oil in this country H. Mart Smith, president of the Oriental Oils Association, urged an immediate protest against the proposed tariff on this oil. In part Mr. Smith said:

"Various farm organizations, through their Washington representatives, recently appeared before the House Ways and Means Committee, asking that all vegetable oils be made dutiable at certain specific rates, but not less than 45 per cent ad valorem. Included in this schedule was China wood oil (otherwise known as tung oil), on which they asked a duty of 5.9c per pound, but not less than 45 per cent ad valorem, the highest rate asked on any vegetable oil.

"Whether duties on vegetable oils that can be used for edible purposes might help some of our farmers, is a debatable question, but as applied to China wood oil, there can be no question but that it would be a distinct detriment to the farmer as well as to the many industries using China wood oil; not a single farmer in the United States could get the slightest benefit from a duty imposed on this oil for the following reasons:

"1. The oil is not produced commercially in the United States and will not be for many years to come. The American Tung Oil Corporation, which is interested in American production, has so stated in its brief to the House Ways and Means Committee and has asked that China wood oil be retained on the free list.

"2. There is no oil produced in the United States which is in any way similar to China wood oil, or that can be used as a real substitute for it.

"3. It is indispensable in the manufacture of high grade varnishes in which about 30 per cent of the American produced rosin is used. Without China wood oil it would be impossible to produce high grade varnishes with rosin.

"4. China wood oil cannot be used in the manufacture of soap and it cannot be used for edible purposes under any circumstances as the oil itself is toxic.

"5. China wood oil does not compete even remotely with any American farm product. It has consistently sold at a price from 5c to 15c per pound higher than linseed oil and irrespective of its price level, is used in increasing volume year after year.

"There has not been a single reason advanced by the proponents of this duty on China wood oil, how or why a duty on China wood oil would in any way help the American farmer."

Editor's Note: The new tariff as passed by the House of Representatives provides for the maintenance of China Wood oil on the free list, and it is to be hoped that the Senate will not change this item.

The Milani test for the purity of olive oil, which depends on the decolorization of eosin, is said to be non-specific for genuineness or purity, because eosin is decolorized by weak acids. Olive oils to which sufficient oleic acid was added to make the acidity 4 per cent in each case all gave a rose color with the Milani reagent, which color vanished on heating. Therefore some olive oils decolorize eosin not because of a reaction with a substance that is present in olive oil and not in other oils, but because of their acidity. This is further confirmed by the fact that pure oleic acid decolorizes the Milani reagent. *Ann. Chim. Applicata* 18, 297-9 (1928).

A proposed simplification in the refining of edible oils offers to eliminate the washing step by the addition of asbestos fiber to the oil, (after settling the soap stock), and subsequent filtration of the oil through a special filter-press where the asbestos is deposited as a paper-thin film, retaining all the remaining impurities. *Seifensieder-Ztg.* 55, 4289 (1928).

Editor's Note: This is somewhat reminiscent of the well-known Baskerville process, which was patented in this country several years ago.

The Toledo Seed & Oil Company, Toledo, Ohio, will extend its operations to include soya bean crushing. No change in plant or equipment is contemplated beyond the installation of a machine to clean the beans.

Methods for Cottonseed Analysis

Preliminary Report Presented at Twentieth Annual Convention American Oil Chemists' Society

By G. S. JAMIESON and R. S. MCKINNEY

AT the request of the industry, methods for the sampling and the analysis of cottonseed are being studied by a committee which has been appointed for this purpose at the Department of Agriculture. Briefly, the object of this Committee's work is to study different methods of sampling and analyzing cotton seed in order to determine those most efficient and accurate, so that they may be used in all analyses made on the authority and responsibility of the Department of Agriculture. The present report will be confined to methods of analysis, as another report covering sampling, together with certain recommendations, will be given by Mr. Meloy this week at the convention of the Interstate Cotton Seed Crushers Association, which will be published by that association.

Before commenting on the several methods studied in connection with the results which we have obtained to date and those obtained by others who have made a special study of these methods, attention is directed to the importance of getting portions for analysis from the sample of seeds which will be representative in so far as that is possible. The difficulty of drawing representative portions naturally increases with the quantity of bald, damaged, aborted seeds in the sample. Experience has shown that the sample, preferably on a smooth stout sheet of paper, must be very thoroughly mixed in a manner so as not to segregate the lighter and heavier portions that will result with any stirring or rotary motion, such as frequently witnessed by the Committee. In Mr. Meloy's report the committee has recommended that samples of approximately 1,000 grams should be sent to the laboratory in sealed airtight containers. It is further recommended that on the receipt of the sample, the chemist should carefully divide it into two equal portions; one portion being returned to the container as a referee sample, the other portion to be used for his analyses.

In reducing samples it is recommended that the mixing and quartering be done by passing the hands upward through a cone-shaped pile, flattening this and quartering by cutting through to the table. The pile of seeds is thus divided as nearly as possible into quarters of equal size; each of these quarters so obtained may be used for each of the determinations to be made, which include those for moisture, ammonia, free fatty acids and oil. Each quarter should be again thoroughly mixed (unless the entire quarter is to be used as a portion for analysis) and flattened into the form of a shallow pile. From this, a few seeds are to be taken at a time, from as many parts of the pile as possible, until a portion of the desired weight has been obtained. The mixing of the sample and drawing the portions for analysis should be done, of course, as rapidly as possible to avoid loss of moisture. It is assumed that the samples submitted for analyses are representative of the shipment of seed, but in actual practice, unfortunately, this assumption heretofore in many cases has not been true.

Determination of Moisture

FOR the sake of comparison, the moisture was determined by the Official Method, in which the weighed portion of cracked seeds was dried at 102-3°, for five hours, and the method based upon drying the seeds for one hour at 130°. All of the moisture determinations were made in ventilated De Khotinsky drying ovens. The results by both procedures checked each other in a satisfactory manner. Only in a few cases did the results by these two methods differ as much as .2 per cent. In so far as we have been able to ascertain the Official Method for moisture gives good results, when the directions are actually followed using the above mentioned ovens.

Determination of Ammonia

THE accuracy of the Official Method for the determination of nitrogen (which is usually stated in terms of ammonia) in seed is well known, provided a suitable sample is used; consequently, no particular study of the method was required. However, a number of analyses were made principally by way of comparison between the results that might be obtained by this method and a modification of it that was suggested in connection with making the entire analysis of a sample of seeds on a single 10 gram portion. In connection with this suggestion the other deter-

minations will be discussed later. After the removal of the oil, the 10 gram portion of seed was digested etc., in the usual manner and finally the solution was diluted to a definite volume in a graduated flask, and the ammonia was determined, using accurate aliquot portions of this solution. The results obtained by these two procedures in no case differed by more than .1 per cent; this was as expected. The results, however, would indicate that in so far as the determination of ammonia is concerned, the smaller portion of seeds taken according to the Official Method are sufficient to yield satisfactory results.

Determination of Free Fatty Acids

SOME attention was given to the determination of the free fatty acids in the oil extracted from the seeds by cold percolation with petroleum ether according to the Tentative Method given in the book of "Rules." In order that more concordant results may be obtained by different laboratories, it is believed that a detailed description of the procedure to be followed in arriving at the end point of the titration should be given. In other words, the end point should be the same in all cases. A visit to various laboratories showed that this was not the case, besides it was observed that several different indicators were being used; comparatively few were found using Alkali Blue, whereas the majority of those visited used phenolphthalein as indicator, which is the one we prefer to all others that have been proposed for this titration. Furthermore, we believe that the titation should be conducted with vigorous shaking until a pink color is obtained that remains permanent for a minute, as this constitutes a perfectly definite end point. To date, we have not made any comparisons of the results given with phenolphthalein and Alkali Blue as indicators.

Determination of Oil in Seed

FOUR methods for the determination of oil were studied. They include the so-called Copes Bag Method, the Cut and Pick Method, the Modified Cut and Pick Method, and the Official (fuming) Method. At the present time, this investigation has not progressed to a stage at which it is possible for us to make any definite recommendation in regard to the procedure best adapted for the determination of oil in cottonseed. This will require some months of further intensive study before such a decision can be made. On the basis of the work that we have done, taken in consideration with that of others who have extensively studied one or more of these methods, it is proposed to discuss certain features of these methods. The criticism that is frequently made of the Official Method is that it gives too high a result for oil in seed, and the principal criticism of the other methods appears to be in regard to the smallness of the portions taken for analyses. Of course it is obvious that if the portions taken are so small that they are not representative of the sample, the results are of little or no value (assuming that the sample itself is representative of the shipment of seed).

It was found that the Cut and Pick Method and the Copes Bag Method gave identical results when the portion taken for analysis was reground and extracted until only negligible quantities of substances were obtained after a further 2 hour extraction. This was found to require from 5 to 7 2-hour extractions on 5 grams of meats. In practice the extractions are not carried to this limit. The last few extractions gave, upon evaporation of the solvent, a semi-solid resinous deposit. In the case of the modified Cut and Pick Method, in which the separated "meats" are dried before extraction, it was observed an appreciable quantity of the resins are not obtained upon further extraction. Consequently this method will give lower results than the original Cut and Pick Method, or the Copes Bag Method, provided the extractions in each case are taken to completion. The smaller quantity of extractable matter (oil, etc.) which is obtained from dried meats (Modified Cut and Pick Method) is in all probability due to the partial polymerization of the resins that takes place during the drying of the meats. Several years ago a study was made at the Department in which it was found that these resins readily polymerize and as the polymerization progresses, the solubility of the resulting product in petroleum, ether, and other solvents diminishes. This alone would account for the somewhat lower results obtained by this method. On account of the fact that we were unable to extract the oil completely from the undried meats without at the same time extracting an excessive quantity of the resins, etc., the original Cut and Pick Method was soon discarded, and attention was then given to the more recent modification of this procedure. In addition to this, it was found through experimentation that different proportions of moisture were lost during the separation of the hulls from meats, but this does not affect the results obtained by the modified method in which the completely dried meats are extracted.

In the case of the Official Method more or less trouble has been experienced in grinding the sample after treatment with hydrochloric acid so as to get the seed in the form of a fine meal that, according to the directions, should pass through a 30-mesh sieve. When

the Wiley mill was used, a notable quantity of the sample that was only partially ground remained behind the blades of the mill. This trouble was largely overcome by passing the entire sample two or three times through the mill but even then not all of the ground sample would pass through a 30-mesh sieve. After extraction of some of these samples, for 4 hours as directed, the meal was further ground in a mortar and again extracted for several hours with the result that almost half a per cent more of extractable material was obtained. This seems to indicate that in the Official Method all of the ether soluble constituents are not extracted, but the results obtained may check very closely the amount of oil in the seed provided the sample has been ground to a certain degree of fineness, prior to extraction. If on the other hand, the sample is more coarsely ground, and to compensate for this defect, the meal is reground after the first extraction, then the results obtained will be higher than the amount of oil in the seed. We believe that it is essential for the seed to be reduced in the beginning to a certain fineness in order to obtain reasonably correct results, and the failure to accomplish this in all probability accounts to no small extent in many instances for the variation in the results obtained by different laboratories. However, it should also be observed that failure to get agreeing results for the same sample of seed is not infrequently due either to the portions of the sample submitted to different laboratories not being representative of the entire sample of the seed or through the failure of the analyst himself in taking portions for his analyses that are not representative of the sample received by him. Several laboratories now use the Official Method for their routine work and in so far as can be ascertained they obtain satisfactory results. It is apparent that they not only employ the same method for grinding the seed, but actually succeed in duplicating each other in this respect to such an extent that their results for oil in seed not only check each other by making one extraction, but they appear to agree very well with the actual quantity of the oil present in the seed. With few exceptions it is believed that much more attention should be paid to getting representative portions of the seed and to the grinding of the seed or meats from which the oil is to be extracted. The writers are acquainted with the much discussed subject regarding what is oil and what is not oil. The quantity of the latter depends to some degree upon the method, but to a larger extent upon the actual procedure used in extracting the seed. It is the presence or absence of more or less of these non-oil constituents in the extracted oil that accounts for the different results obtained by the different methods in the hands of different analysts, as has been previously indicated. However, we are not in a position to discuss the subject further in this report.

A method has been proposed that is based on taking a 10-gram portion of the sample and using it for the determinations of moisture, oil, ammonia and oil instead of the more customary practice of taking a separate portion of the sample for each determination. Directions were sent along with a request that we should study this method. In view of some obvious advantages such a method might possess over the others being investigated, considerable attention was given to it. After the moisture has been determined on the 10-gram portion of seed which previously had been cracked, the next step is to grind it in an iron mortar with the addition of some ground glass to facilitate the grinding; the next step is to extract the oil. Incidentally, it was found that the sample could be ground alone as readily as with the glass, the absence of which later on in the analysis was particularly desirable. The results obtained for oil in seeds were always lower than those obtained by either the Official or the Cut and Pick Methods, and the variations ranged from .5 to 1.9 per cent. Duplicate analyses by this method differed up to .7 per cent, even though every precaution possible was taken to check results. It should be observed that the samples which were selected for this investigation contained a considerable quantity of damaged seeds. It was not definitely known why the results for oil showed such wide variations. Although some of this difference may have been due to the non-uniformity of the portions of seeds taken for analysis, it is believed that the chief difficulty was on account of not being able to grind the seeds so that each portion would be in approximately the same condition of fineness.

The next step, according to the directions, was to titrate the free fatty acids in an aliquot portion of the petroleum ether extract and use the remainder of the solution for the determination of oil. Owing to the difficulty of taking an accurate aliquot portion and at the same time avoiding the introduction of an error in the estimation of the oil in the remainder of the solution, this was not done. Following the extraction of the oil, the meal is digested and the ammonia determined as previously described.

It is our intention to continue the investigation as rapidly as possible. Any suggestions from the members of this Society will be welcomed.

Studies on Gossypol: A Progress Report

From the Food Research Division, Chemical & Technological Research, Bureau of Chemistry & Soils, United States Department of Agriculture, Washington, D. C.

By E. P. CLARK

DURING the past year, work upon the study of cottonseed meal and gossypol has continued along the lines indicated in the report presented to this Society at the annual meeting here last May[1]. Some of the results obtained in this investigation are summarized in the following outline.

In the course of the year's work a new supply of gossypol had to be prepared, and because of greater familiarity with the properties of the phenol, it was possible to devise a more economical and convenient method for its preparation. Since the availability of gossypol for future work is important the improved procedure for its preparation is given. Ten kg. ground cottonseed are percolated during 3 hours with sufficient ether to yield approximately 30 liters of extract. The ether is recovered by distillation, and the residue is filtered through activated carbon. The filtrate is dissolved in an equal volume of petroleum ether and then treated with the same volume of acetic acid. Crystallization of the so-called acetate begins at once, and the process is complete within a few hours. The yield corresponds to approximately 90 per cent of that in the seed, and the product is much purer than the preparation made by the method previously reported[2].

In continuing the oxidative degradation studies of gossypol, the products obtained by chromic acid oxidation of certain gossypol derivatives referred to in the report mentioned before have been further investigated[3]. These derivatives are hexaacetyl gossypol, hexaacetyl apogossypol and apogossypol hexamethyl ether.

When dissolved in acetic acid and oxidized with an aqueous solution of chromic acid, hexaacetyl gossypol yields a bright yellow neutral compound which begins to darken at 210° and becomes a black mass at 230° without definitely melting. This substance has the molecular formula $C_{33}H_{30}O_{12}$. It possesses no carboxyl or free hydroxly groups but has four acetyl groups and is therefore a tetraacetyl derivative of a substance, $C_{25}H_{22}O_8$, to which the name *gossypolone* has been given. The derivative obtained is therefore tetraacetyl gossypolone. From the foregoing facts it follows that, in the formation of tetraacetyl gossypolone from hexaacetyl gossypol, two acetyl groups are replaced by two quinone groups, and carbon and hydrogen are lost in such proportions that gossypolone has a smaller molecular weight than gossypol by C_5H_8. Tetraacetyl gossypolone readily condenses with aniline in much the same manner as does gossypol. The condensation product is a chocolate colored micro-crystalline substance which imparts a deep wine red color to solvents capable of dissolving it. It would appear from this that the two carbonyl groups originally in gossypol have not been materially affected in the new substance.

When hexaacetyl apogossypol is treated in the same manner as hexaacetyl gossypol, except that Kiliani's chromic acid mixture[4] is used, a substance similar in appearance to tetraacetyl gossypolone is obtained. This is a neutral material having a melting point of 230° and a molecular formula of $C_{30}H_{28}O_{10}$. It has been shown to be a tetraacetyl derivative of a compound $C_{22}H_{20}O_6$. The name assigned to this substance is *apogossypolone*. In the reaction by which this material is formed, as in the previous one, two quinone groups have been substituted for two acetyl groups, and the new nonacetylated derivative has a smaller molecular weight than apogossypol by C_6H_{10}. One property of this new acetyl derivative which distinguishes it from tetraacetyl gossypolone is its inability to condense with aniline.

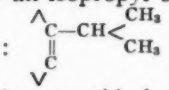
The oxidation of apogossypol hexamethyl ether with chromic and sulfuric acids (Kiliani's mixture) gives a bright yellow neutral crystalline compound, $C_{32}H_{34}O_8$, having a melting point of 210°. It has been established that this material is a tetramethyl ether of a tetraquinone, $C_{28}H_{26}O_8$. The name *pseudogossypolone* has been assigned this substance, and hence the C_{32} compound isolated is *tetramethoxy pseudogossypolone*. The process by which it is formed is analogous to the reactions involving the acetyl derivatives discussed before, in that two quinone groups have been substi-

[1] Presented before the American Oil Chemists' Society at New Orleans, La.

tuted for two methoxyl groups. On the other hand, methoxy derivatives of gossypol in general are more resistant to reagents than the corresponding acetyl derivatives. In this experiment chromic acid did not attack the apogossypol molecule in such a manner as to cause a loss of carbon. Two quinone groups, however, were substituted for two hydrogen atoms.

Further oxidation of the acetyl derivatives of gossypolone and apogossypolone with potassium permanganate were successful only in that they showed that no isobutyric acid was formed as is the case with gossypol. No crystalline derivatives were obtained. However, the oxidation of pseudogossypolone tetramethyl ether with potassium permanganate gave two crystalline acids and evidence of isobutyric acid. The first acid obtained, which has been designated as apogossypolic acid, is a white crystalline substance that begins to sinter at 140° and melts with the evolution of gas at 164°. It is a trimethyl ether of a tricarboxylic acid, $C_{20}H_{24}O_9$. When heated to the temperature of its melting point it loses one molecule of water, giving a new acid, $C_{20}H_{22}O_8$, which melts at 95°. This acid appears to be a trimethyl ether of a ketonic dicarboxylic acid; but further work is necessary to verify this point.

The second acid referred to above is obtained from the mother liquors from the first acid. It is an orange crystalline product which melts at 116°. It appears to be a dicarboxylic acid produced as an intermediate stage in the formation of apogossypolic acid; but since the work upon this substance has not been completed, a definite statement concerning it will have to be withheld.

The fact that isobutyric acid is not found as a permanganate oxidation product of the acetyl derivatives of gossypolone and apogossypolone indicates that the loss of the elements C_5H_8 and C_6H_{10} in these reactions is due in part to the breaking of a ring to which is attached an isopropyl side chain. It has previously been pointed out[5] that one of the products of the permanganate oxidation of gossypol is isobutyric acid and further, that this indicates the presence of a group $-\overset{|}{\underset{|}{C}}-CH<^{CH_3}_{CH_3}$ in the gossypol molecule. Since no definite evidence of an ethylene linkage could be obtained, the isobutyl group as indicated above is very possibly an isopropyl side chain attached to a ring thus:  The rupture of the ring could reasonably be expected to yield isobutyric acid.

Another approach to the structural relationships existing in the gossypol molecule has been attempted through a Beckmann rearrangement of the dioxime. The reaction, however, is not simple, and, although a number of promising derivatives have been obtained, no definite results can be reported at this time, since the study of these compounds has not yet progressed to a point where the data available can be correlated. It is hoped that at a future time it will be possible to report upon this work.

Biological Experiments With

E. M. NELSON *and* D. B. JONES

IN the report referred to before some biological experiments were presented showing that white rats respond readily to the toxic action of gossypol and hence may be employed for studying the physiological effect of this important phenol. Curves were also shown, representing the influence on the growth of rats fed upon a normal diet to which gossypol had been added in quantities sufficient to cause death in a relatively short time.

In continuing this work the effect of feeding lower levels of gossypol upon the growth rates of rats has been studied, and data are now available showing the effect upon rats of diets containing proportions of gossypol ranging from levels which only slightly influence the growth rate to quantities capable of producing death in a short time. The results of these studies are given in the form of curves on Charts 1, 2, and 3.

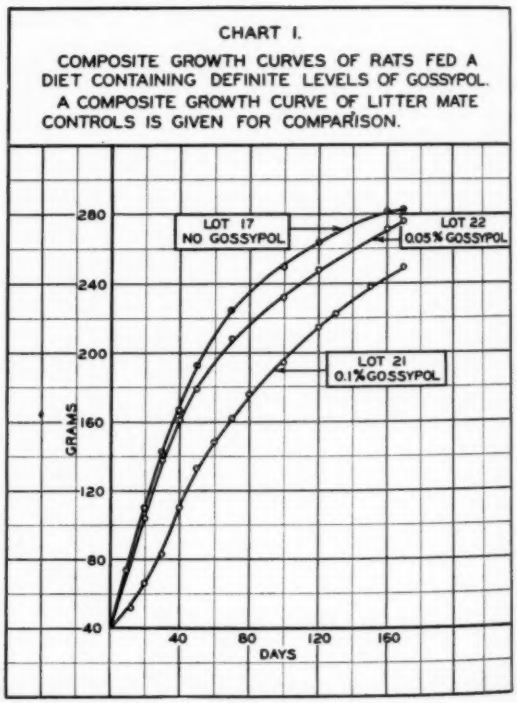


Fig. 1

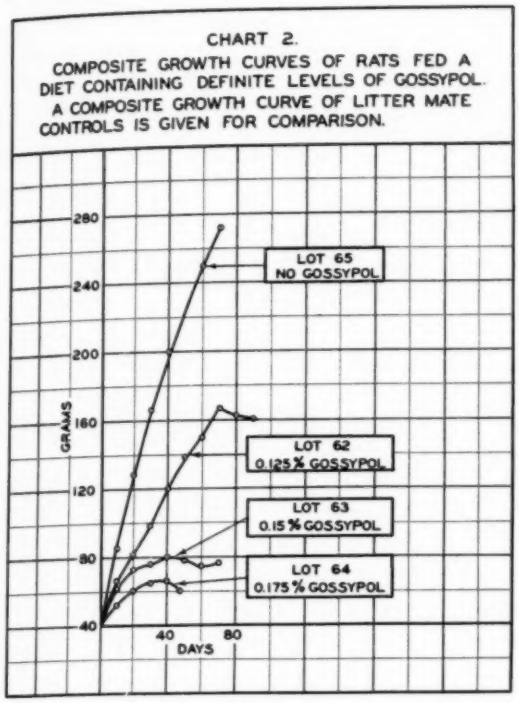


Fig. 2

Each graph except on Chart 3 represents the composite growth curve of 4 animals comparable as to age, sex and parentage. The curves on Chart 1 show that the growth rate of rats is retarded when the animals receive low levels of gossypol and that the retardation is proportional to the quantity of gossypol in the diet. The maximum difference in average weights between the control lot and the lots fed low levels of gossypol occurred at 80 to 90 days, or at about the end of the rapid growing period of the controls.

Chart 2 shows the sensitivity of rats to small differences in the quantity of gossypol in their diet. Lot 65 was discontinued at the end of 70 days; the animals in Lot 62 were alive, but losing weight after 105 days. The termination of the curves for Lots 63 and 64 indicates the point at which one animal in the

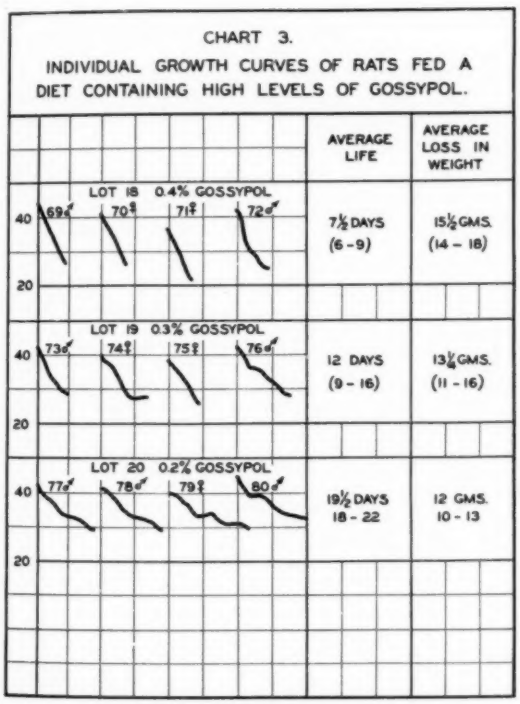


Fig. 3

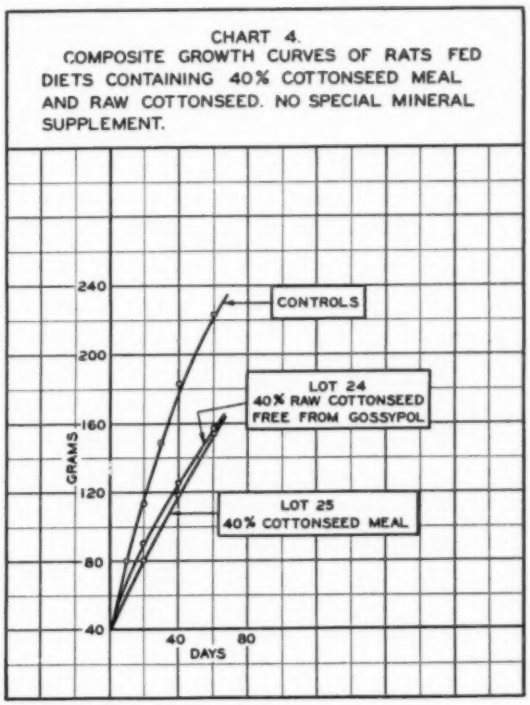


Fig. 4

respective group died. Three animals in Lot 63 died at 70, 76, and 99 days respectively, and at the end of 105 days the remaining animal was emaciated and losing weight rapidly. In Lot 64 the life of the rats ranged from 46 to 99 days, the average being 67 days.

The results represented by Chart 3 show remarkable uniformity in the response of the animals to the effect of pure gossypol when it is fed at decidedly toxic levels. As the quantities of gossypol in the diet were decreased, the period of survival increased and the daily loss in weight lessened. On the 0.4 per cent level the average daily loss of weight was 2 grams; on the 0.3 per cent level it was 1.1 gram

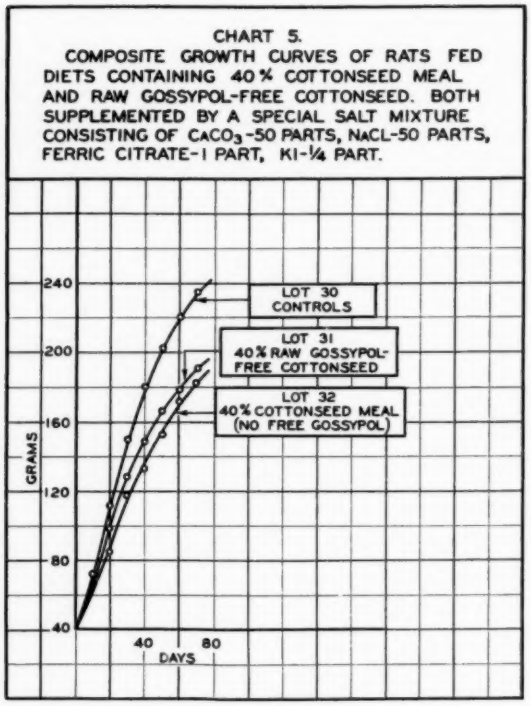


CHART 5.
COMPOSITE GROWTH CURVES OF RATS FED DIETS CONTAINING 40% COTTONSEED MEAL AND RAW GOSSYPOL-FREE COTTONSEED. BOTH SUPPLEMENTED BY A SPECIAL SALT MIXTURE CONSISTING OF $CaCO_3$-50 PARTS, NaCL-50 PARTS, FERRIC CITRATE-1 PART, KI-¼ PART.
LOT 30 CONTROLS
LOT 31 40% RAW GOSSYPOL-FREE COTTONSEED
LOT 32 40% COTTONSEED MEAL (NO FREE GOSSYPOL)
GRAMS
240
200
160
120
80
40
40
80
DAYS

Fig. 5

and on the 0.2 per cent level it was 0.6 gram. Lot 17 in Chart 1 shows the performance of litter mate controls on a gossypol-free diet.

In the previous report it was indicated that when the protein of a diet is supplied entirely by cottonseed meal flour, or raw cottonseed free from gossypol, the ash content of the cottonseed products influences the growth rate of the animals. Experiments bearing upon this point have been continued, and the results are presented graphically on Charts 4 and 5. From an analysis of the curves it will be seen that a 1 per cent mineral supplement consisting of calcium carbonate—50 parts; sodium chloride—50 parts; ferric citrate—1 part, and potassium iodide—¼ part, added to the cottonseed ration, increases the growth rate of the animals approximately 15 per cent.

It is to be noted, however, that the growth rate of the animals fed upon the cottonseed products, even when supplemented by the salt mixture, is decidedly inferior to that of the controls. Attention is also directed to the slightly superior growth rates of the animals fed upon a ration containing raw, gossypol-free cottonseed as compared with the growth rates of the animals fed upon a cottonseed meal ration.

In looking for an explanation for the inferior growth rate of the animals fed upon a salt supplemented cottonseed ration, as compared with the growth rates of controls on a normal diet, attention was directed to the influence of a protein supplement. In the experiments represented by Chart 6 the same diets were fed as in the experiments recorded by Chart 5, except that 6 per cent casein was added. The curves of the two charts show that the growth rate of the animals fed the casein supplemented diet was superior to that of the rats on a diet that contained no casein. The same influence is shown by the experiments recorded on Charts 7 and 8. In addition the results recorded by Chart 7 show the physiological effects of cottonseed meals prepared by different commercial processes. Cottonseed meal No. 1 (an Expeller meal) contained no free gossypol, and, when supplemented by 6 per cent casein, gave a growth rate almost the same as that of the control animals; the addition of 12 per cent casein gave identical growth rates. The difference in average weight between Lots 45 and 49 was never more than 7 grams and during 80 per cent of the experimental period it was 4 grams or less. Cottonseed meal No. 2, which was a special process meal, showed a demonstrable toxicity. The retardation of growth corresponded to that which would be produced by approximately 0.05 per cent free gossypol. A

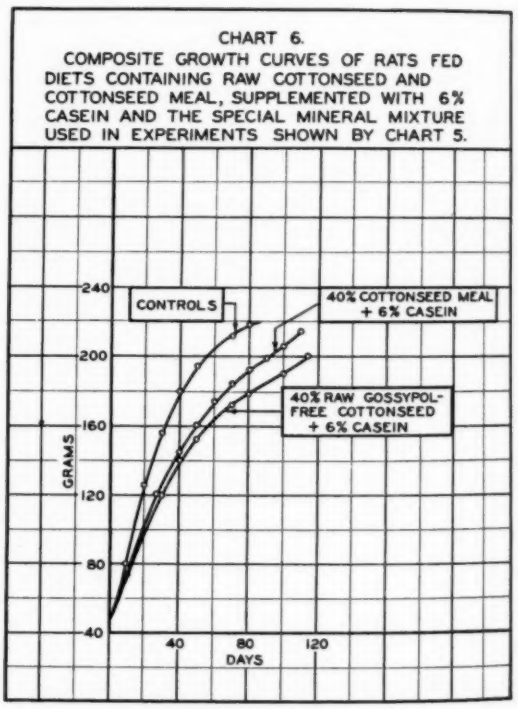


Fig. 6

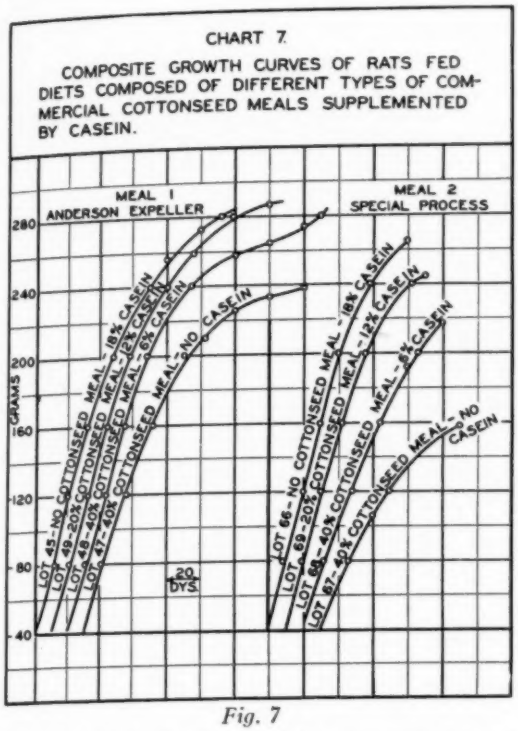


CHART 7.
COMPOSITE GROWTH CURVES OF RATS FED DIETS COMPOSED OF DIFFERENT TYPES OF COMMERCIAL COTTONSEED MEALS SUPPLEMENTED BY CASEIN.
MEAL 1 ANDERSON EXPELLER
MEAL 2 SPECIAL PROCESS
GRAMS
280
240
200
160
120
80
40
20 DYS.
LOT 45 - NO COTTONSEED MEAL - 18% CASEIN
LOT 49 - 20% COTTONSEED MEAL - 12% CASEIN
LOT 48 - 40% COTTONSEED MEAL - 6% CASEIN
LOT 47 - 40% COTTONSEED MEAL - NO CASEIN
LOT 66 - NO COTTONSEED MEAL - 18% CASEIN
LOT 69 - 20% COTTONSEED MEAL - 12% CASEIN
LOT 68 - 40% COTTONSEED MEAL - 6% CASEIN
LOT 67 - 40% COTTONSEED MEAL - NO CASEIN

Fig. 7

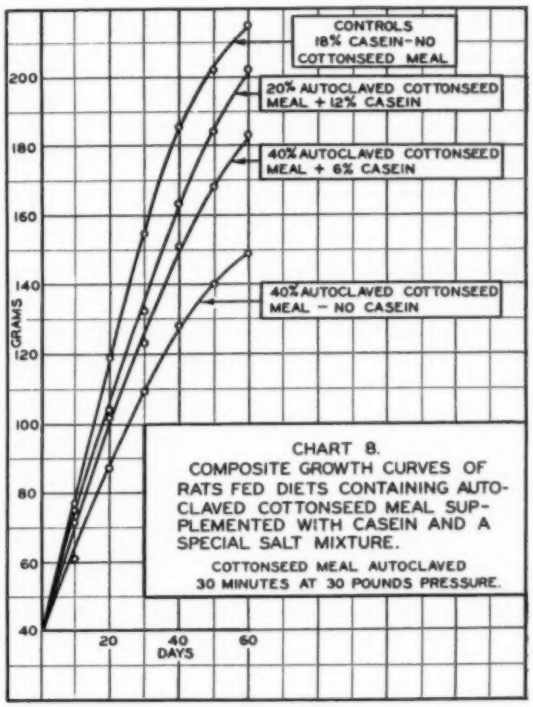


Fig. 8

chemical analysis showed the presence of .06 per cent.

Chart 8 is presented not only to show the influence of casein, but also to verify the claims made concerning the beneficial effects of autoclaving cottonseed meal according to the Menaul process.[6] The meal used in these experiments was the same as used in the experiments recorded by Chart 5. Comparison of the two charts will show that, in spite of the claims made,[7] the growth rate of rats fed on the autoclaved cottonseed meal is inferior to that attained by the rats fed upon the unautoclaved meal.

Further work along the plan just outlined, as well as other phases of the problem, is necessary, but the results thus far obtained warrant the following conclusions:

1. White rats respond readily to the toxic action of gossypol, and they may be used as an accurate means of determining physiologically the free gossypol content of cottonseed meal.

2. Growth rates of rats fed upon diets containing high levels of cottonseed meal are accelerated by a protein supplement. The growth rates are also influenced by the composition of an added mineral supplement.

3. The results shown by chart 7 indicate that *bound gossypol per se* has no influence upon the growth rate of rats. This conclusion follows from the fact that rats grew normally on diets containing *bound gossypol* equivalent to 0.4 to 0.6 per cent of free gossypol.

4. Growth curves of rats fed upon a diet containing autoclaved cottonseed meal prepared according to the Menaul process show that feeding the autoclaved meal resulted in growth rates inferior to those obtained with untreated meal.

In applying these findings to practical live stock feeding, it would appear that the proper method of using cottonseed meal would be as a protein supplement to other feedstuffs. Such a mixed feed should be balanced so that a proper ratio exists between the protein, carbohydrate, fat and mineral constituents. Since the proteins of the components of the mixed feed, other than cottonseed meal, would undoubtedly function in the same manner as does casein in the experiments just recorded, there is little doubt that, by an intelligent use of cottonseed meal as a protein supplement to a mixed feed, an excellent stock ration should result.

Bibliography

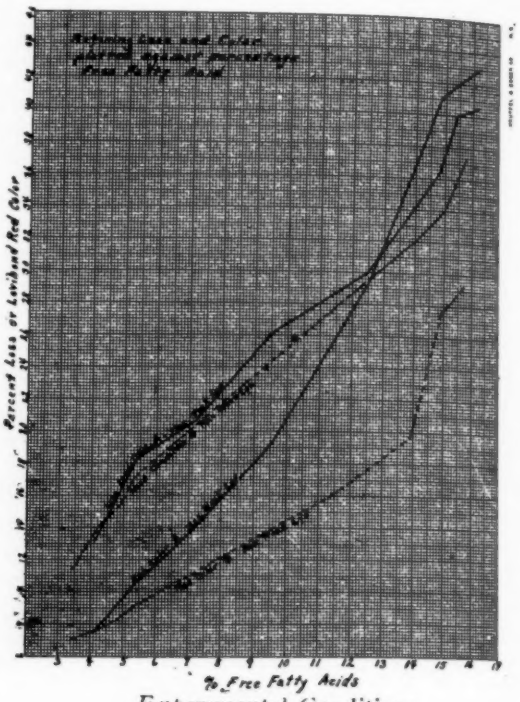
[1] Clark, E. P., Oil and Fat Ind., 238-242, 273-277 (1928).
[2] Clark, E. P., J. Biol. Chem., 75, 730 (1927).
[3] Clark, E. P., J. Amer. Chem. Soc., 51, 1475 (1929).
[4] Kiliani H., Ber., 46, 676 (1913).
[5] Clark, E. P., J. Biol. Chem., 77, 81 (1928).
[6] U. S. Patent No. 1,553,634.
[7] Dowell, C. T., and Menaul, Paul, J. Agric. Research, 26, 9 (1923).
Gallup, W. D., J. Dairy Science, 9, 359 (1926).

Report of Committee on Crude Mill Operations

By A. K. SCHWARTZ, *Chairman*

THE Committee on Crude Mill Operations during the season has attempted to duplicate with a French continuous cooker the experiments made last year with the open cooker. The open cooker experiments reported to the Society last May gave in detail the effect of the individual variables upon the cooking process, on the quality of oil and on the extent of extraction as indicated by analysis of the cake. This attempt was, it was found, unsuccessful for the reason that in making any one test the quality of seed had changed. The continuous cooker requires too long a time for the establishment of one set of experimental conditions to make this method practical.

The work of last year was reviewed and the generalization made that the most important cooking factor governing the quality of oil was the rate of heating of meats, that governing the extent of extraction being the time of cook with a corresponding increase or decrease in the moisture of meats. It appeared that if the two sets of conditions were chosen so that the rate of heating, the time of cooking and amount of moisture added were increased in one as compared with the other that the condition in which these factors were increased should produce an oil of better quality and cake of better standard than the other condition. To confirm this, two cooking conditions were established representing a variation in these factors to an extent liable to occur in ordinary mill operation. The quality of seed was varied and samples taken at regular time intervals. The results confirming the generalization are given below:



Experimental Conditions

Condition A

Stage of Cooker	Jacket Pressure Pounds Gage	Temp. °F
1	20	110-132
2	20	132-170
3	40	180-215
4	60	218-224
5	60	228-230

Condition B

Stage of Cooker	Jacket Pressure Pounds Gage	Temp. °F
1	60	120-153
2	60	170-224
3	40	220-227
4	20	225-228
5	20	230-230

	Sample		%FFA	Maximum Strong Lye Color		Loss	Maximum Weak Lye Color		Loss
1	Condition	A	15.4	35y	63.0r	41.5	35y	42.0r	40.0
2	"	"	16.2	35y	57.0r	42.0	35y	43.0r	40.6
3	"	"	14.8	35y	34.0r	39.2	35y	41.0r	36.5
4	"	"	12.5	35y	24.0	36.7	35y	29.3	30.0
5	"	"	9.5	35y	16.2	31.0	35y	19.2	26.1
6	"	"	7.2	35y	12.5	25.6	35y	14.0	20.7
7	"	"	5.4	35y	9.2	22.0	35y	10.6	18.3
8	"	"	4.1	35y	6.2	14.6	35y	7.5	13.0
1	"	B	3.45	35y	6.1	12.6	35y	7.1	11.4
2	"	"	4.2	35y	7.2	14.5	35y	7.7	14.0
3	"	"	4.95	35y	8.1	19.0	35y	8.5	15.5
4	"	"	5.3	35y	8.1	19.3	35y	9.1	17.1
5	"	"	11.45	35y	13.5	35.1	35y	16.1	27.8
6	"	"	13.80	35y	15.5	37.5	35y	19.7	31.7
7	"	"	14.90	35y	20.2	40.0	35y	27.5	33.9
8	"	"	15.70	35y	28.3	42.7	35y	29.2	37.3

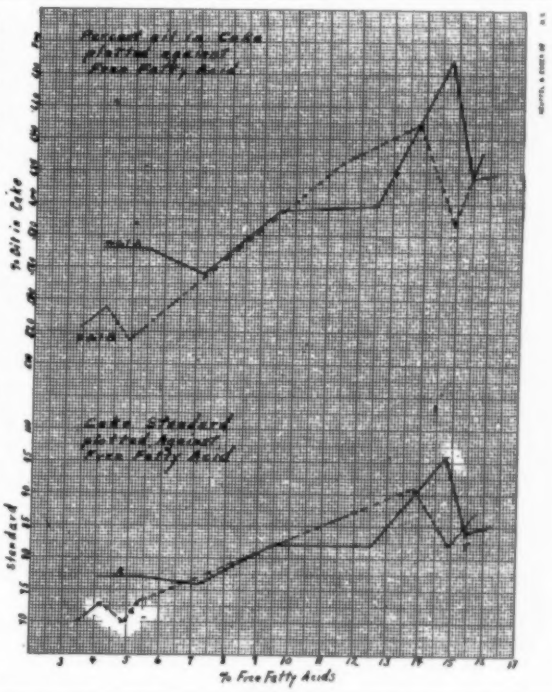
Cake Analysis

Sample No.			Moisture	NH_3	Protein	Oil	Standard
1	Condition	A	8.55	7.30	37.50	6.16	84.0
2	"	"	8.57	7.30	37.50	6.18	85.0
3	"	"	8.43	7.18	36.91	6.89	96.0
4	"	"	8.94	7.30	37.50	5.98	82.0
5	"	"	8.83	7.30	37.50	5.95	82.0
6	"	"	9.27	7.35	37.75	5.56	76.0
7	"	"	9.16	7.40	38.03	5.72	77.0
8	"	"	8.75	7.38	37.94	5.72	77.0
1	"	B	8.87	7.43	38.19	5.23	70.0
2	"	"	9.10	7.30	37.50	5.35	73.0
3	"	"	8.51	7.40	38.03	5.15	70.0
4	"	"	9.17	7.25	37.25	5.30	73.0
5	"	"	8.56	7.23	37.16	6.25	86.0
6	"	"	8.63	7.13	36.63	6.50	91.0
7	"	"	8.36	7.18	36.91	5.87	82.0
8	"	"	8.60	7.20	37.00	6.31	87.0

In condition A no direct steam was used, while in B direct steam was allowed to enter into the second stage. The total time of cooking was the same in both cases. Due to the quick rise in temperature the effective time of cooking was increased by about 20 minutes in condition B, and due to the condensation of the direct steam the moisture of meats in condition B was increased over that in A.

The refining tests in which the maximum of weak lye was used gave good refining, while those in which the maximum of strong lye was used gave spongy soaps from which considerable oil was recovered by remelting. The oil recovered by remelting was equivalent to as much as 3% loss. For this reason the results given for the strong lye are not so reliable as those given for the weak lye. For convenient inspection the results are plotted in the form of a curve.

In this work we wish to acknowledge the co-operation and aid of Mr. Eugene Bradshaw.



To improve the miscibility of castor oil with mineral lubricating oils, the castor oil is heated to a high temperature (550°-575° F.) in vacuo. It is claimed that this treatment produces polymerization of the castor oil. The action is usually carried on until the miscibility of the castor oil with alcohol disappears and that with mineral oils increases. A slow flow of carbon dioxide is usually, but not invariably, passed through the oil during the heating. Can. Pat. 285,743.

All the oil may be released from fish or fish offal by cutting the material into small pieces and treating it with a solution of ferric sulfate, (frequently in combination with aluminum sulfate) and leaving the mass to pickle for 2 to 24 hours. When the pickling is complete the material is put through a helical conveyor immersed in boiling water to extract the oil. Can. Pat. No. 285,632.

In the determination of the saponification number a clear solution of oil in alcoholic potash is not proof of complete saponification, since the oil forms an ester with alcohol which is soluble in potassium hydroxide. Experiments with ethyl esters required five to ten minutes boiling before saponification was complete. Fifty percent excess of potassium hydroxide is essential for rapid reaction. Methyl alcohol in place of ethyl is out of the question because saponification is incomplete even after one or two hours boiling. *Seifensieder Ztg.* 55,375-6 (1928).

Industrial and Educational Cooperation

Address before Twentieth Annual Convention of The American Oil Chemists' Society

By C. C. HEDGES

Department Head of Chemical Engineering, A. & M. College of Texas

IT gives me pleasure to say a few words to this society in regard to the field of chemistry and its relation to the progress of different industries. Chemistry, as you know, may be considered one of the exact and most fundamental sciences and its province, in the classical definition of Ostwald, is "The Study of the Different Forms of Matter, Their Properties and the Changes Which They Undergo." The industrial chemist asks no better definition of science than that it is organized common sense and that men of science are men trained in common sense.

The study of chemistry embraces the entire material universe, our solar system, the distant stars and the small particles that float through space, known as dust. There is not a thing in the world, living or inanimate, that the knowledge of chemistry does not help you to understand and appreciate to the best advantage. It is directly concerned with the physical basis of our bodies, with the food we eat, with the water we drink, the air we breathe, the materials upon which we work in our daily labor, and the things we buy and sell in our daily life. We live surrounded by an ocean of air and we draw some of this air into our lungs about eighteen times a minute. It has a certain approximate chemical composition which influences our daily life by the oxidation or consumption of the food we consume within our bodies producing energy and heat and building up broken down tissues. Our body is nothing more than a human furnace which consumes fuel as food, and produces both mental and physical power by the use of the oxygen of the air to support the combustion of that food. You know it is a fact that you have to furnish a certain limited amount of air to a furnace, or you will not get maximum efficiency; so it is that the human body has to breathe plenty of pure air. There is not a thing you handle every day that does not have a chemical composition, and I would like to see the inquisitive side of all natures so developed that they could not come in contact with any material thing unless they asked the questions: What is its composition? What can be produced from it? The world, as viewed by different individuals, generations, and races of men, provides different realizations of the beauty of nature and dreams of unknown possibilities. To the chemist it is a field of opportunity for the onward progress of science and industries.

This is a chemical age, and we live, move and have our physical being as a result of chemical processes, and whether we travel on foot in chrome-tanned shoes and rayon stockings or go to work on rubber wheels and concrete roads, we travel in comfort by "the grace and good-will" of science. Tons of sulphuric acid and arsenic used to be blown from the tops of smokestacks of copper smelters, killing animals and plants on neighboring farms, but today these poisons have been harnessed by science; the arsenic put to work for agriculture in killing the boll-weevil and the sulphuric acid used to make phosphate rock available to feed the hungry plants as fertilizer. By suspending a few crystals of copper sulphate in water the growth of plants known as algae can be controlled in our water supplies and the irrigation ditches freed of this nuisance thereby increasing the wealth of the irrigation regions. A scientist is your defense against laws more dangerous to break than any others—the laws of nature. If business breaks these laws, the penalty is usually death. The industry cries out too often that they have millions for defense but not one cent for keeping out of trouble before it happens. Chemical science is the dominating factor in the field of human welfare.

Efficiency before Productivity

THIS should not necessarily be a day of increased productivity but it should be a day of increased efficiency in production, and every industry of recent development recognizes this fact. The field of an industrial chemist is broad and the harvest in all industries is ready. This is true in all the large industries where they need men trained in chemical knowledge for the control of their processes. They are crying out every day for young men who know something definite and can put it to practical use. As you know,

knowledge is power, but if you cannot put this knowledge to some practical use it is worthless. It is the application of the theories you have learned that makes you of value to yourself and your fellow-men. Otherwise you are nothing more than a cog in the wheel of the advancing industries. This is a day of conservation and you hear a great deal in regard to the conservation of our natural resources. We should not only conserve our natual resources but we should practice the conservation or use of our waste materials from the different industries. At one time the potash salts that exist in the Stasfurt Mines were considered an impurity as they were working the mines for common salt and they were abandoned for that purpose because of these impurities. But today these mines are worked for the potash salts they contain and this has grown to be one of the large industries in the world. As you know, milk is composed of the following constituents: fat, casein, albumin, ash and milk sugar. They use the fat to make butter; the casein in the making of cheese, artificial ivory, combs, billiard balls, cold water paints; and milk sugar in medicinal preparations and for the sugar coating of pills. It was believed at first that the albumin was an undesirable nitrogenous waste material, hard to get rid of, as it was easily decomposed and they paid farmers to haul it away. It was first used as a fertilizer, then as a chicken feed and today it is regarded as one of the important constituents of baby foods. The by-products of the packing and soap industries were at first regarded undesirable but today they are very important and profitable products. Our duty therefore is to persuade these chemical facts to work for industry.

If the South is to become one of the leading manufacturing sections of the Union it will be necessary for the industries to look to the engineeing colleges for men to direct these enterprizes with efficiency and skill. In the past when competition was not so strong it was possible to make rapid strides under less efficient leadership but today, and more so, tomorrow, the success of any industry will be measured by the efficiency of its management and research. Those of you who have done the pioneer work in building the great cotton seed oil interests of this section have shown your skill and your ability, but you well know that you must have trained assistants if your businesses are to become larger and more successful. The management must be in the hands of men trained for the purpose either in college or in the "school of hard knocks." Industries must not only recognize executive ability but the value of research if they expect to meet competition and this condition will be more and more marked as the industries of the state develop. Eternal research is the price of survival in modern industry. Science is advancing so rapidly and with results of such far reaching influence that no industry can hope to ignore research and live. Industries must understand that we are in the midst of an industrial revolution, in the course of which many established businesses will find their balance sheets deeply colored with red unless those in executive control can read the handwriting on the wall and direct their course in the flood of new knowledge coming from the research laboratories.

Industrial developments along new lines are everywhere in progress. They call upon the chemical engineer for new equipment and new methods of production and control. Do you think that the progressive men connected with one of the oldest and largest industries are going to be content to sit idly by the tide of progress? Will they be satisified to use old methods based on "rule of thumb" and not let scientific methods show them the way to new industrial efficiency in milling and refining? Will they not be progressive enough to say "what is good enough for father is not good enough for me" and make the cotton seed oil industry one of the most advanced of all? I would not for a moment have you infer that I think a college course can give a man anything which it is not possible for him to get himself outside of college, but I do believe that it is only the exceptional man who will get it outside. The college course merely provides a more orderly procedure in the mental training, and a more logical sequence in the development of the students' "thinking powers." The South from an industrial standpoint is one of the wealthiest sections in the Union but she needs trained men to develop and control her industries. The State of Texas raises one-fourth the cotton to clothe the world, yet she imports practically all of her wearing material. She produces large quantities of cotton seed oil but imports soap, produces hides to shoe the nation but imports all her shoes. The work of the engineer is the changing of the raw material into the finished product with the greatest efficiency and with the least possible cost of production. He substitutes a rigid control of processes for guess work and uncertainty and increases the productivity of labor by supplying more efficient processes, where the standard and quality of the finished products are revised, and the amount of seconds and rejections are reduced. This should not only

be a day of increased productivity but it should be a day of increased efficiency in production, and every industry of recent development recognizes this fact. How many business men can tell the quality of the gas, coal, or lignite they are burning, or the amount of slate or other impurities they are purchasing for fuel? How many pay two prices for their lubricating oil while with a little control work and expense they could materially increase their profits? Do you call this industrial efficency? This is not efficiency, but wastefulness and the time is coming when all material will be bought and sold under specification, defining the quality desired and making rigid tests to make sure quality is received. This would be more satisfactory to the producer and the consumer.

Engineering Education

COURSES in engineering in the colleges are occupying a position of constantly increasing importance. The development may be said to be due not only to the recognition of the importance of engineering in the training of every liberally educated person but to the fact that the development of the industries are dependent upon a thorough knowledge of engineering. The engineering courses at the Agricultural and Mechanical College of Texas are designed to prepare men for industrial leadership. Every industry should be under the control of a man trained for that purpose. He who builds the factories and directs the processes of manufacture is an engineer. Texas has educated few men along this line and the demand of industries for engineers is increasing more rapidly than men with engineering training can be supplied. The industries are constantly crying out for men who know what they want and want what they know. The A. & M. College of Texas asks only the opportunity to help the industries in selecting men for their organizations by recommending to them men who have stood the test by sticking to a four year course in college through many difficulties and by living in dormitories where they have to learn to live in harmony with their associates. We do not expect to prepare young men ready to step immediately into positions where they must assume great responsibility and display mature judgment. We try to impress on the boys the idea that their education is merely a foundation on which they must build and I believe you will find that what the young men ask is merely a chance to begin at the bottom and find their own level. They seek the opportunity to learn your business with a living wage comparable to their training. They do not ask favors on the strength of their diplomas, but merely the opportunity of showing what they can do with the training they have received. Hard work is not a new experience to most of these boys for a very large number of them have earned a considerable part of their college expenses. My purpose here is not to ask you to assist in giving employment to our graduates for, as a matter of fact, the demand far exceeds the supply, and practically every young man who is graduating this year from our engineering classes has already definitely accepted employment, and we could have placed three times as many.

Competition in industry is so strong that we can no longer ignore the possibility of increasing profits by a larger and more efficient production. This is a day of centralization of wealth, of power, of commerce, or marketing, of farming and of industry where the brain of one master mind controls the policies of large production and distribution. The methods of today are no longer the methods of yesterday. What was good enough for father in business is no longer good enough for us. Today is not today but more like tomorrow for we keep step with the revolving world so closely that the twilight of today becomes the dawning of tomorrow. Sunset and sunrise are as one. The advancement of science in the cotton seed oil business has only begun. The surface of efficiency has only been scratched, and in the next ten years the industry will be completely changed so that its processes will be placed upon a more scientific basis and the mills will be controlled and supervised from the laboratory. Guess work will be superseded by exact knowledge obtained through research. Through the application of chemistry and engineering these possibilities will be realized.

So looking forward to the possibilities of advancement of science in the great cotton seed oil industry, the Agricultural and Mechanical College of Texas through its Department of Chemistry and Chemical Engineering has put forward every effort to develop industrial cooperation with the educational institutions. This contact was at first attempted by the establishment of a lectureship whereby the Texas Cotton Seed Crushers' Association sent to the College representatives from the industry to speak to our students of the commercial processes and outline to them the opportunity for scientific control and advancement. This opened the way for a closer contact as the officials of the association became more interested in our college work and recognized the fact that we were training Chemical Engineers for the industries of Texas and the South. Today

(*Turn to Page* 42)

Planning and Uniform Methods Committee

Work of the Society's Committees Reviewed and Commented Upon by Co-ordinating Body

By J. J. VOLLERTSEN, *Chairman*

THE Planning and Uniform Methods Committee has studied the work and reports of the Society's various committees and submits the following recommendations with respect to their work.

Detergent Committee

THIS committee has been doing good work and has been showing very definite progress. It should be continued.

Refining Committee

THE refining committee makes the following recommendations:

"Tentative Method for Refining Corn Oil:

The apparatus and general procedure shall be exactly as prescribed for hydraulic pressed crude oil, with the following exceptions: The choice of lye shall be a concentration of 16 degrees in all cases. Two refining tests shall always be made, using respectively ½ and ⅔ of the maximum amount of caustic soda permitted for hydraulic crude cottonseed oil having the same F.F.A. The soap stock may be hardened by chilling in ice water, if necessary, to permit draining the oil from the soap stock.

"Tentative Method for Refining Soya Bean Oil:

The apparatus and general procedure shall be the same as prescribed for hydraulic pressed crude cottonseed oil, with the following exceptions: Choice of lye shall be 14 degrees in all cases, and two tests shall be made using respectively ½ and ⅔ of the maximum amount permitted for hydraulic crude cottonseed oil having the same F.F.A. The soap stock may be hardened by chilling in ice water, if necessary, to permit draining the oil from the soap stock.

"Color Glasses:

We recommend that three glasses be required for use in all color readings, one colorless glass to be used as the third glass when only one yellow and one red are needed.

"We recommend that the plan of having an investigator be continued for the work of the Refining Committee, and we also recommend it to the Society for the work of other committees, where a similar study of variable conditions is to be made, as we consider it the quickest and surest way to obtain results.

"For next year's committee we recommend the following:

"(a) Complete the work on Peanut Oil

(b) Investigate the refining of Coconut Oil.

(c) Investigate the effect of different filter papers and other conditions in the filtering of refined oils with regard to the effect of these conditions on the color."

The Uniform Methods Committee approve all of the above and recommend their adoption. With reference to the plan of having investigators paid by the Society to assist the various committees, it is understood that such action shall only be undertaken when in the judgment of the Governing Committee it is advisable, and if the funds of the Society will permit.

Color Committee

THIS Committee did some very interesting work and submitted several recommendations, which we will cover separately.

"1. That a standard set of Lovibond Glasses consist of the following yellow and red glasses.

Yel.:	4.0	6.0	3.0	10.0	12.0	14.0	16.0
	18.0	20.0	35.0	and	50.0		
Red:	0.1	0.2	0.3	0.4	0.5	0.6	0.7
	0.8	0.9	1.0	2.0	2.5	3.0	3.5
	4.0	5.0	7.6	8.0	9.0	10.0	11.0
	12.0	16.0	and	20.0"			

We do not approve the adoption of this recommendation.

"2. That the following number of glasses be used to make a color determination: Only one yellow glass, not more than two red glasses up to and including 13.0 red; not more than three red glasses above 13.0 red.

"We see no reason why the determination of grade should not be made with the above glasses instead of one yellow and one red as specified in the present rule unless this Society is prepared to find a way to supply the glasses of the exact standard. The present glasses such as 7.6 red and 13.0 red, when standardized by the Bureau of Standards, are found to be off. This necessitates the using of other glasses."

We do not approve the adoption of this recommendation inasmuch as this matter is covered by the report of the Refining Committee, which has already been adopted.

"3. That the Society adopt the Enclosed Wesson Type Tintometer. We realize that this tintometer is not satisfactory in every way, but is the most satisfactory yet designed and recommended to the Society. It is recommended to the Society only until a more satisfactory one has been designed and adopted by the Society. The most satisfactory tintometer of this type

is offered as the Emil Greiner Company's Constant Light Colorimeter."

We believe that a standard tintometer is a necessity and also that very definite specifications covering the size, inclination of the magnesia block, and all other dimensions, are needed, and would suggest that next year's committee be instructed to submit definite specifications for such an instrument.

"4. That only artificial light produced by 100 Watt Blue Frosted light Electric Bulb be allowed. It is necessary to move this change as the manufacturers have discontinued making the 75 Watt Daylight Blue Lamp."

We approve this recommendation.

"5. That the Society adopt the tube for holding the samples of oil to be examined, eliminating from the rule the glass oil sample bottles."

We approve this recommendation.

"6. Committee feels that the question of filter paper is a problem for the Refining Committee as well as the Color Committee. There is evidence that on off oils, cold pressed oils, and oils not refined 'clear' that the type of filter paper makes a great deal of difference in color. When oils are refined perfectly 'clear' the type of filter paper is not so important. At the present, it is sufficient to recommend a good heavy grade, close texture, white paper."

We approve this recommendation with the suggestion that the Refining and Color Committees for the coming year be instructed to bring in recommendations for a definite paper.

Olive Oil Committee

WE recommend that this committee be continued.

Sampler Committee

NO report was received from this Committee. We recommend that this Committee be continued with instructions that they try out the sampler at various plants and bring in a report containing definite recommendations regarding the adoption of a standard sampler.

Committee on Crude Mill Operations

THE report of this Committee contained some very interesting information but carried no recommendations which require action by the Uniform Methods Committee.

Moisture Committee

WE recommend the adoption of the oven described by this Committee, which has been used by several members of the association as official, and suggest the reporting of the moisture by the participants of the Smalley Foundation work, without taking these results into consideration in awarding prizes.

Kreis Test Committee

WE recommend the continuance of this Committee for another year.

Report of the Kreis Test Committee

IN the first phase of the committee's work, in which only three members participated, a procedure for making the Kreis Test essentially similar to that of Kerr (Ind. Eng. Chem. *10,* 471-5 [1918]) was studied. It was found that this procedure readily gives reproducible results in the same laboratory over a given short period of time.

In the second and more important phase of the committee's work, samples of six wintered cottonseed oils, which had received varying exposure to air at different points in their processing, were sent to each member of the committee. These have been studied from the viewpoint of the uniformity of the Kreis Test as reported by different laboratories (tables I and II) and from the viewpoint of the possible value of the Kreis Test as an index to the degree of rancidity of the samples as received (table III) as well as the degree of rancidity developed after further exposure of the samples to air (table IV). The samples used had been selected by the chairman from original oils of good quality and were free from objectionable odor and flavor except such as were developed by exposure to air during processing. Therefore it seemed proper to consider off odor and flavor in these samples as due to rancidity, even though most of them did not possess in high degree the distinctive disagreeable odor and flavor characteristic of the last stages of rancidity.

Table I

Kreis Test as Reported by Different Laboratories on Wintered Cottonseed Oil Diluted 1:10 with Mineral Oil

Sample No.	Observer 1	2	3	4	5
A	Neg.	Neg.	Pos.	Neg.	Neg.
B	Neg.	Pos.	Pos.	Pos.	Pos.
C	Neg.	Neg.	Pos.	Neg.	Pos.
D	Neg.	Neg.	Pos.	Neg.	Pos.
E	Neg.	Neg.	Pos.	Pos.	Pos.
F	Neg.	Pos.	Pos.	Pos.	Pos.

The six samples were put into clean tightly stoppered bottles on March 20 and were opened and promptly examined by observers 1, 2, 4 and 5 between the dates March 27 and March 30. They were examined by observer No. 3 on April 8, but presumably not exposed to oxidation in the meanwhile. The wide discrepancies in the results obtained can scarcely have been due to change in the samples after packing.

The most significant result in the work of the committee to date is the failure of different laboratories to agree on whether the Kreis Test is positive or negative for a given oil sample.

Table II

Order of Increasing Intensity of Kreis Test

Observer	Increasing Intensity (left to right)
1	A, C, D, E, F, B
2	(A C), D, E, F, B
3	C, F, E, D, A, B
4	A, C, D, E, F, B
5	A, (C D), E, (B F)
Average	A, C, D, E, F, B

(Note: The order of intensity of Kreis Test was determined in different ways by various observers, in some cases without dilution with mineral oil.)

Development of Rancidity after Exposure of Sample to Air

Observer No.	Order of Decreasing Quality after Exposure to Air Several Weeks
1	A, B, D, E, F, C
2	(A C D F), B, E
3	(C E F), A, B, D
4	A, F, (B E), C, D
Average	A, F, B, E, C, D

(Note: The time of exposure was the same for all samples of any one observer, but not the same for all observers.)

Table III

Order of Increasing Rancidity or Decreasing Quality

Observer No.	Decreasing Quality (left to right)
1	A, B, D, F, E, C
2	(A C D F), (B E)
4	A, F, E, B, D, C
4	A, F, E, B, D, C
Average	A, B, F, (E D), C

Table IV

The average grading of the samples fails to disclose any correlation between intensity of Kreis Test and rancidity or quality of the oil as judged by flavor, but no definite conclusion on this point can be drawn from the erratic results which have been obtained. Obviously further work will be required if the committee is to accomplish the purpose for which it was appointed, namely, to determine the value of the Kreis Test as an index to the degree of rancidity. Up to the present, it is even uncertain whether the Kreis Test can be so standardized as to give reproducible results in different laboratories.

A. S. RICHARDSON,
Chairman, Kreis Test Committee

Report of the Olive Oil Committee

We have had before us the problem of differentiating between virgin olive oil and refined olive oil by the identification of minute quantities of soap in refined olive oil and the absence of soap in virgin olive oil. The spectroscope for sodium, and the microscope for sodium chloride, were the basis of our plan for identifying the sodium from soap. We have also had before us the problem of differentiating between virgin olive oil, and mixtures of virgin olive oil with refined olive oil, by the use of ultra violet light.

Under date of December 28, 1928 the Chairman had a letter from Dr. G. S. Jamieson, oil, fat, and wax laboratory, U. S. Dept. of Agriculture, Washington, D. C., stating that his assistant Mr. McKinney did not find the minute quantity of sodium from the soap in refined olive oil, although Mr. McKinney is thoroughly experienced in making micro-analysis. Under date of February 11, 1929 the Chairman received a letter from M. L. Sheely, Chief Chemist, Armour Soap Works, Chicago. He also did not find the minute quantity of sodium from the soap in the refined olive oil. On March 10th the Chairman visited Dr. Jamieson in Washington. From our conversation we agreed that the method for finding sodium chloride is too delicate for routine analysis.

On April 9th the Chairman visited M. F. Lauro and Wallace H. Dickhart, both of the Bureau of Chemistry, New York Produce Exchange, New York City. Mr. Lauro identified sodium by means of its double salt with uranyl acetate, triangular crystals growing to light yellow tetrahedra under the microscope. From another portion he also identified sodium by the double sulphate of soda and bismuth, showing slender prisms or rods under the microscope. Mr. Dickhart has developed a method using alcoholic solution of sulphuric acid and alcoholic solution of furfurol. A red color is produced. The virgin olive oils turn foggy, while the refined remain clear. The color is then removed by titrating with n/10 sodium thiosulphate. Five different virgin olive oils and five different refined olive oils were tested. The virgin oils all had a higher thiosulphate number than the refined oils. Dickhart will have in the near future a paper in detail for our Journal. It is planned by our committee to repeat these interesting methods, and further report will be given. Meanwhile several members of the Olive Oil Committee are cooperating with Sidney Musher of the Pompeian Corporation, Baltimore, repeating his extensive work on various olive oils using the ultra violet ray for the detection of refined in virgin olive oil. When his work has been repeated by these members a further report shall be given.

LOUIS M. ROEG,
Chairman.

Position Wanted—Man with 18 years' experience in the refining and bleaching of oils and in the manufacture of soaps. For further information, address M. A. W., P. O. Box 67, Milwaukee Junction Station, Detroit, Mich.

Iodine Values on Menhaden Fish Oil

By C. H. Bankes and A. R. Lange,
Swan-Finch Oil Corporation

THE following experiments were undertaken in order to determine which of the existing methods is the quickest and most accurate for the determination of iodine values on Menhaden fish oil. Much work has been done along these lines since Hubl introduced his methods for the quantitative absorption of iodine of fats (J. S. C. I. 1884, 3,641) and even today his method is considered by many authorities as the most accurate. (Schmidt-Nielsen and Owe). It is claimed that the results obtained by the Hubl method are nearest to the theoretical values. One great disadvantage of the Hubl method however, is the long time required for the reaction, making it impossible for many industrial laboratories to use this method where rapid work is required.

Among the many other different methods there are only two of real practical value: The Wijs and the Hanus methods. All the other methods of test give more or less unreliable results as far as Menhaden Fish Oil is concerned. As stated before, much work has been done along these lines, but as far as we could find out after consulting a great deal of literature pertaining to iodine values, no comparative tests were ever made in order to find out how the values obtained by the two methods check up on the same material at different times given for the reaction.

The Wijs solutions used for the experiments was prepared as follows: 13 grams of resublimed iodine were dissolved in 1 liter of glacial acetic acid. When completely dissolved a blank was run with N/10 sodium thiosulphate solution and then dry chlorine was passed through the iodine solution until the first blank was exactly doubled. This solution was kept in an amber colored bottle. The Hanus Solution was made up by dissolving 13.5 grams of resublimed iodine in 1 liter of glacial acetic acid. When completely dissolved 3cc. of Bromine were added. This solution was also kept in an amber colored bottle. The iodine values were determined by weighing about 0.15 grams of oil into a wide-necked stoppered flask of 250 cc. capacity. The oil was dissolved in 15 cc. of chloroform and 25 cc. Wijs or Hanus solution added. After moistening the stopper of the flask with a 15 percent KI solution, the mixture was allowed to stand in the dark for the time required for the reaction. After standing, the stopper and neck of the flask were washed down with 15cc. of a 15 percent KI solution and the excess of iodine titrated with N/10 sodium thiosulphate solution, using 5 cc. conc. HCL and 20 cc. of a 1/N $K_2Cr_2O_7$ Two tests were run for each determination. In order to determine the strength of the sodium thiosulphate solution, 10 cc. of an exactly 10 percent KI solution were taken and 5 cc. conc. H1 and 20 cc. of a 1/N $K_2Cr_2O_7$ solution added. By this exactly 0.2 gram of iodine are liberated. This amount is titrated with the sodium thiosulphate solution to be tested and the strength calculated.

Great care was taken that all the flasks were absolutely clean and that all determinations were run at a temperature of 70°F.

The samples represented refined Menhaden fish oil:

#1	containing	2.75%	free	fatty	acid
#2	"	4.08%	"	"	"
#3	"	10.39%	"	"	"

The results were as follows:

No. 1 Sample

Hanus		Wijs	
Time	Iodine Value	Time	Iodine Value
15 Min.	169.3	15 Min.	180.1
30 "	174.3	30 "	180.2
45 "	177.5	45 "	180.4
60 "	177.8	60 "	180.8
75 "	178.7	75 "	180.9
90 "	178.9	95 "	180.7
180 "	182.6	180 "	181.1

No. 2 Sample

15 Min.	170.0	15 Min.	179.4
30 "	170.2	30 "	180.0
45 "	175.0	45 "	180.2
60 "	175.0	60 "	180.4
75 "	178.7	75 "	180.3
90 "	179.8	90 "	180.5
180 "	182.3	180 "	181.7

No. 3 Sample

15 Min.	169.6	15 Min.	175.1
30 "	170.3	30 "	175.3
45 "	171.4	45 "	176.0
60 "	173.5	60 "	176.1
75 "	173.3	75 "	177.6
90 "	173.2	90 "	180.0
180 "	173.1	180 "	180.3

These figures show that the Wijs method requires less time for the reaction than the Hanus method. The iodine values by both methods increase relatively to the time allowed for the iodine absorption. However, the Wijs values show a very uniform increase; the values obtained by the Hanus method do not increase in the same proportions, but show a very irregular movement. The Wijs values increase very little after the first 15 minutes, whereas the Hanus values show a very great difference even between 90 and 180 minutes time allowed for the reaction. These facts prove that the reaction with the Wijs solution is almost completed after the first 15 minutes; the reaction with the Hanus solution is not completed even after 90 minutes. The Wijs values on sample #3 do not show the same uniform increase as on samples #1 and #2. It is possible that the high content of free fatty acids tends to retard the reaction. But even on this sample we can see that the figures show a far more uniform increase than the Hanus values, where even after 180 minutes the absorption does not seem to be completed.

From the above given facts we must come to the conclusion that the Wijs method is far more reliable and faster than the Hanus method for the determination of iodine values on fish oils. Furthermore, it is safe to say that the Wijs method requires not more than half an hour for oils up to 5 percent and one hour for oils containing over 5 percent free fatty acids as time required for the reaction. It is claimed that any excess of Chlorine (Schmids-Nielsen and Owe J. S. C. I. 1924, 43, B 302) in the Wijs solution tends to give unreliable results (too high), whereas Ueno (J. S. C. I. 1916, 35, 367) is not of the same opinion. After much experimenting along these lines, we must agree with Ueno. A Wijs solution containing a little excess of chlorine gives iodine values practically identical with those obtained with a so-called "normal" solution. A very large excess of chlorine in the solution gives too high values which however tend to become normal after the solution has been kept for several days. It is therefore advisable to let the solution stand for 2 or 3 days before using it. This procedure is much better than trying to adjust the solution with an iodine solution containing no chlorine.

A slight excess of iodine is of no advantage as far as we could see by running Iodine values with Wijs solution containing a slight excess of Iodine. The results were practically the same as those obtained by a solution containing an excess of Chlorine. However, it seems that a solution containing an excess of Iodine is not as stable as with an excess of Chlorine. In addition we made several experiments in order to find out if and to what degree the iodine values are effected by running the tests at different temperatures. These experiments revealed that for each 10°F over 70°F the value is increased by about 0.6, using either the Wijs or Hanus method.

2 samples representing refined Menhaden fish oil.

1. Sample—Wijs Method

At 70°F.	176.7
" 80°F.	177.3
" 90°F.	177.8
" 100°F.	178.5

2. Sample—Hanus Method

At 70°F.	175.0
" 80°F.	175.9
" 90°F.	176.5
" 100°F.	177.1

A newly patented oil-refining process provides for the admixture with the oil to be refined of dry powdered alkali intimately mixed with a finely divided solid adsorbent carrier material such as fuller's earth; and the addition of just sufficient water to promote rapid neutralization and agglomeration of the resultant soapstock. U. S. Pat. No. 1,705,825.

ABSTRACTS

David Wesson, *Abstract Editor*

In the analysis of Turkey-red oils intended for use in the textile industries, sulforicinic acid is the essential ingredient and the amount of organic sulfur trioxide determines the quality of the oil. While the percentage of total fat is important, the "wetting" ability and the resistance against lime, magnesium sulfate and lye are more important. These properties are functions of the percentage of organic sulfur tiroxide. *Seifensieder-Ztg.* 55,419-21 (1928)

A new method for the determination of unsaponifiable matter in oils and fats has been proposed by E. L. Smith. The method is based on the use of sulfuric ether rather than petrolic ether for the extraction of the unsaponifiable matter, and the washing of the ether extract with alcohol and weak hydrochloric acid to remove last traces of soap and basic impurities. *Analyst* 53, 632-41 (1928).

Glycerol esters may be prepared from fatty acids or from oils or fats containing fatty acids by heating with glycerol in vacuo, in an apparatus in which the pressure may be reduced to 2 mm. by an ejector placed between the reaction vessel and a condenser. Brit. Pat. No. 291,767.

Fats, etc., are bleached by treatment with commercial hydrogen peroxide solution and with a peroxide insoluble or sparingly soluble in water, such as barium peroxide, according to Aust. Pat. No. 109,719.

The addition of large amounts of resin, oil, naphthenic acids, acid resinates, ester gums, etc., etc., limits the gelatin of chinawood oil when heated above 250° F. Similarly, small amounts of various agents, such as oxidizers, reducers, terpenes, aldehydes, etc. prevent gelation. *Farbe u. Lack* 558 (1928).

Colorless products are obtained by the sulfonation of castor oil or of a similar fatty oil in the presence of reducing bleaching agents, (such as sulfites, hyposulfites) or of oxidizing bleaching agents in a quantity in excess of that required for catalysis of the sulfonation. Brit. Pat. No. 294,621.

A new method for the detection of peanut oil adulteration in olive oil depends upon the varying solubilities of the lithium salts of the fatty acids in ethyl alcohol. The lithium soaps of pure peanut oil and of mixtures of this oil with olive oil precipitate from their alcoholic solutions at higher temperatures than the lithium soaps of olive oil, this temperature differential being directly proportional to the quantity of peanut oil present. *Ann. chim. applicata* 18, 368-86 (1928).

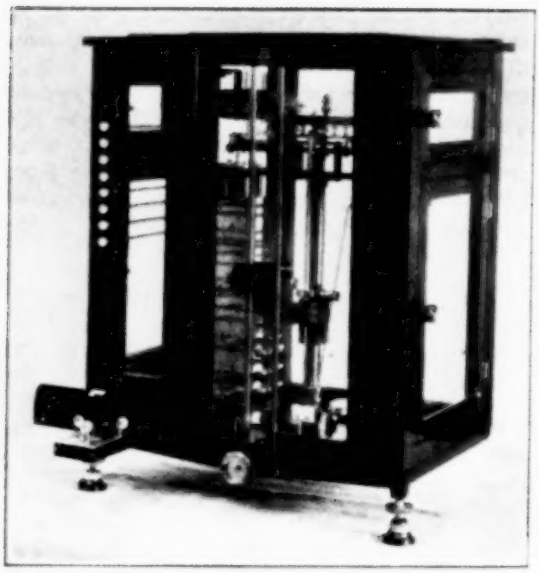
The capryl-acid number of fats rises progressively as the fats are heated at 150° C. or over in contact with air or by treatment with steam, but does not rise when heated in a current of carbonic acid gas or of hydrogen. Prolonged exposure of normal fat to ultra-violet rays destroys the distillate fraction which causes luminescence, and raises the capryl-acid number. *Z. Unters Lebens,* 55, (1928).

There are two methods at present in use for the bleaching of bone fat—chemical bleaching by means of oxidizing agents such as chromates and chlorates, and adsorption bleaching with the aid of bleaching earths. Both methods will yield no satisfactory bleached product when the crude oil is badly polluted with organic impurities. In the case of chemical bleaching this is because the oxidizing agents do not suffice to decompose all the organic impurities, and may also be used up in attacking the fat-substance itself somewhat. In the case of adsorption bleaching the bleaching earth tends t oadsorb the decomposition products of the organic impurities, as well as the coloring matters, so that perfect purification by bleaching would require too great an amount of bleaching earth for economy. *Seifensieder-Ztg.*

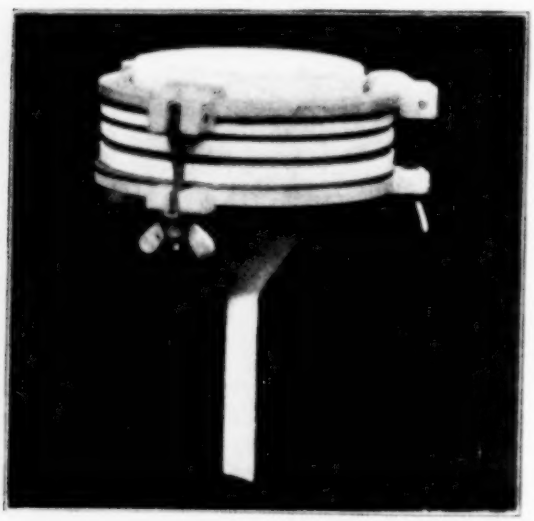
Pressed soya bean oil from Manchuria has been found to be lower in specific gravity, higher in unsaponifiable matter than oils extracted by pressure in Germany and Holland. It also shows a violet-blue fluorescence, which is due to the presence of about 0.4 percent of unsaponifiable impurities. *Chem. Weekblad* 25, 630-2 (1928).

New High Speed Balance

A NEW high speed analytical balance, manufactured by Sartorius-Werke A. G. of Goettingen, Germany, has been introduced into the United States. The new balance is termed the Industrial Rapid Balance by the manufacturer and is said to be five times as fast as the ordinary balance because of the complete mechanical handling of the weights. The scale is equipped with a special air dampener to prevent prolonged oscillation and thus increase the speed of weighing. An experienced operator on the old type balance can make a complete and accurate weighing and reading (automatically recorded) in a half-minute. The sale of the balance and of other Sartorius equipment in the United States is being handled exclusively by Pfaltz & Bauer, Inc., New York.



Sartorius High Speed Analytical Balance



Zsigmondy Membrane Filter

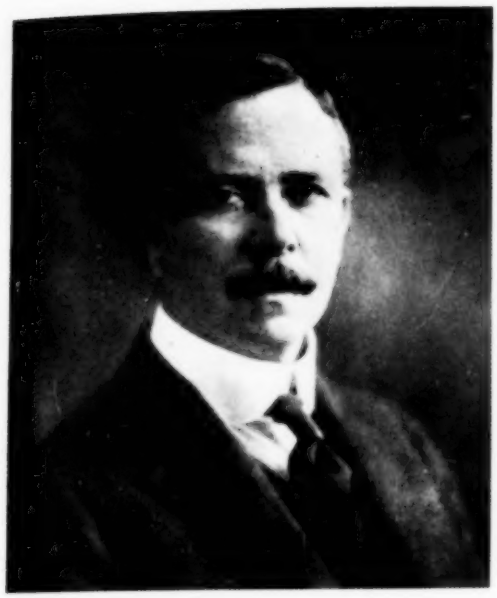
The company is also offering a new type membrane filter called the Zsigmondy membrane filter made by Membranfilter, G. M. B. H. of Germany. The membranes are specially prepared from a nitrocellulose base and are designed for analytical, bacteriological and colloidal filtration. A sample of colloidal gold solution has been successfully filtered with this new type, according to Pfaltz & Bauer. The membranes may be used a number of times each. Illustrations of both pieces of equipment are shown.

In a study of chlorinated herring oil and its soap it has been observed that the increase in saponification number of the chlorinated oil is due to the fact that a part of the combined chlorine is acted upon by alkali-forming sodium chloride. The increase of saponification value, viscosity, specific gravity and index of refraction, and the decrease in iodine number varies over a wide range with different samples of chlorinated herring oil, probably because of difference in ratio of substitution to addition in the chlorination, and varying amount of chlorine in the molecules of the chlorinated fatty acids. The color of the herring oil was darkened by the chlorination and the characteristic fish oil odor was destroyed, but soaps made from the chlorinated oils were of poor quality, generally speaking. *Kogyo Kwagaku Zasshi* 32, 71-73 B. (Supplemental Binding)

Bellier's reaction, generally characteristic for the presence of peanut oil in olive oil, is recommended as a valuable aid in the identification of inferior grades of olive oil. Whereas peanut oil in alcoholic solution forms a flocculent precipitate with caustic potash solution, which precipitate dissolves in the alcohol at temperatures above 40°, the olive oils of inferior quality show turbidity, or at most a gelatinous precipitation with the same reaction, which does not disappear even upon heating the alcoholic solution to 70°. *Ind. olii grassi* 1927, VII.

Spaulding Bakeries, Inc., 346 Greenwich Street, New York City, are new Active Members of the Mayonnaise Products Manufacturers Association of America.

Ernst Twitchell, 1863-1929



Ernst Twitchell

BY the death, in Cincinnati on June 6, of Ernst Twitchell, the soap, fatty oil, glycerine and candle industries have been deprived of one of their greatest scholars. Ernst Twitchell was born in Cincinnati, February 26, 1863, and was educated at the Woodward High School and the University of Cincinnati. His early life was marked by struggle to assist in the support of his widowed mother while obtaining his education. In 1886 he became chemist and general manager of the Emery Candle Company, his association with this company continuing for over forty years. Here it was that he conducted his patient, careful researches which resulted in the discovery and development of the "Twitchell Process" with which his name is associated throughout the world. This process, based upon the dissociation of fatty acids and glycerine by means of the catalytic action of naphthalene stearosulfonic acid has been of incalculable value to soap manufacturers, candle manufacturers, refiners of oils, and all others engaged in productive and developmental work with fats and oils and fatty acids and their products.

Coming from a family of scientists, Dr. Twitchell turned naturally to chemistry as a vocation. He possessed, besides, a diversified taste in literature and a keen appreciation of the arts. Though of a quiet and retiring disposition, he made friends easily, as he was kind and understanding, with a personality that inspired confidence. Having been sought by many who regarded him as the master mind in the chemistry of oils and fats, he kept his associates' interest stimulated by informal talks about the latest scientific news or speculation. He was ready and willing to help any man by sound advice, and was easy of approach by even the humblest worker.

Dr. Twitchell received the degree of Bachelor of Science from the University of Cincinnati with the Class of 1886, and in 1915 his Alma Mater conferred the Honorary Degree of Doctor of Science upon him. In 1917 he was awarded the Perkin Medal of the Society of Chemical Industry for "Original and valuable work in applied chemistry." He was a member of The American Chemical Society, of The Chemists' Club of New York, and for many years had served as a member of the Board of Education of Cincinnati.

Although there were no exports of sesame seed or castor beans to the United States from Manchuria during the first quarter of 1928, during the same period this year, Manchuria shipped 2,000,000 pounds of sesame seed and approximately 600,000 pounds of castor beans. In 1928, for the first quarter, Manchurian exports to the United States of hempseed were slightly in excess of 1,500,000 pounds. This year they dropped to just over 1,000,000 pounds. Shelled peanut exports declined from about 2,000,000 pounds during the first quarter of 1928 to 1,245,000 pounds this year for the same period.

Wesson Oil & Snowdrift Co. $7 preferred stock has been withdrawn from the New York Stock Exchange, having been retired by the Company.

An increase in the authorized common stock of the Glidden Company, has been recommended by the directors of the company. It is planned to use these additional shares to pay extra dividends each quarter or as earnings justify. A special stockholders meeting will be called to authorize the increase in stock.

A new cotton oil mill will be built at Union, Miss. It is understood that the new mill will be located near the Wade & Stephens cotton gin. Other large gins are located in and around Union, which are expected to furnish ample seed for the new enterprise.

The S. Blick Company, Inc., of New York City are new Associate Members of the Mayonnaise Products Manufacturers Association of America, Inc.

Market Report on

FATS, OILS AND GREASES

(*As of June 26, 1929*)

NEW YORK—The prices of oils, fats and greases continued generally downward throughout the recent period. Slackened demand, due to unwillingness to buy in a falling market, and seasonal inactivity, caused price cuts in a good many items. Coconut oil, corn oil, palm and palm kernel oil and olive oil foots were all priced lower at the close. The greases also declined in price. Red oil, stearic acid, olive oil and fish oils were unchanged in price. The cottonseed oil market was unchanged also. Linseed oil showed a good amount of strength as demand began to expand seasonally. Chinawood oil likewise was firmer after reports of disturbed conditions abroad. The general tone of the market was quiet, with sales reported in small volume.

Chinawood Oil

One of the few tendencies to strength in a weak market was shown by chinawood oil. Disturbing reports from producing areas caused a rise in the price of coast tanks and futures to 13½c lb. Spot prices did not change in spite of the fact that supplies at hand do not seem sufficient to take care of the usual demand.

Coconut Oil

Quiet prevailed in the coconut oil market, with few inquiries and a consequent decline in prices. Manila tanks were quoted at 7c lb. in New York, and at 6½c lb. on the Pacific coast. Ceylon bbls. were priced at 7⅞c lb. in New York, with coast tanks selling at 6½c. Copra was priced at 4c lb., the lowest price since last season.

Corn Oil

The price of corn oil in tanks at the mills was lowered again during the recent period to 8c lb. Other corn oil prices stayed the same. Offerings of oil were light.

Cottonseed Oil

The market for cottonseed oil was quiet and uneventful, with P. S. Y. quotations unchanged, and crude prices nominal. Favorable weather conditions were reported in the South, pointing toward a satisfactory cotton crop.

Fish Oils

A normal business was done in fish oils with no price changes noted in cod, herring, menhaden, salmon, sardine, sperm or whale oils. Crude oil quotations were still nominal in most cases, but fresh supplies are soon to be expected on the market.

Grease

The general weakness in competing products caused a decline in the prices of the various greases. White was quoted at 6¾c to 8¼c lb., with brown at 6¼c to 6½c lb. Yellow and house greases were selling at 6⅜c to 6⅝c lb.

Lard

City tierces rose ¼c lb. to 11¾c during the period, while the compound was declining from the 11½c figure to 11¼c. Middle western tierces and prime western tierces were also priced ¼c lb. higher in each case. There was no great activity in lard, sales being on a small basis.

Linseed Oil

The seasonal increase in consumption continued to exert its effect on the price of linseed oil, a four point advance occurring during the recent period. Raw oil in cars was quoted at 10 7/10c lb., with boiled oil in tanks also higher at 10 3/10c. Refined linseed oil in bbls. was offered at 11 2/5c to 11 4/5c lb. Cake was again priced at $42.50 ton, with meal at $50.00.

Olive Oil and Olive Oil Foots

Olive oil was unchanged in price, being quoted at $1.20 to $1.25 gal. Foots were slightly lower than at the close of last period at 9¾c to 10c lb. Little activity was reported in commercial oil, but inquiry on foots sharpened considerably after the price shading. Crop reports from Italy and Spain are considered favorable.

Palm and Palm Kernel Oil

Prices of these products declined during the period, as one result of the general weakness of the market. Lagos oil was mentioned at 7½c lb., on spot, with Niger at 7⅛c. Palm kernel oil was priced at 7½c to 7¾c lb. in packages.

Red Oil and Stearic Acid

Prices on these products were unchanged during the recent period after declines in both for the last few months, due to weakness in the basic raw materials. No further declines in raw materials were encountered.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.14½	.14¾
Coast, tanks, spot	lb.	.13½	—
Futures	lb.	.13½	—
Coconut, Ceylon grade, bbls.	lb.	.07⅞	.08
Coast, tanks	lb.	.06½	—
Cochin grade, bbls.	lb.	.08¼	.90
Manila, bbls.	lb.	.07⅞	.08
Tanks, N. Y.	lb.	.07	—
Coast tanks	lb.	.06½	—
Fatty acids, mill, tanks	lb.	.10½	.10¾
Cod, Newfoundland, bbls.	gal.	.63	.64
Copra, bags, Coast	lb.	.04	—
Corn, tanks, mills	lb.	.08	—
Bbls., New York	lb.	.10¾	—
Refined, bbls.	lb.	.11¾	—
Fatty acid	lb.	.10	.10¼
Cottonseed, crude, tasks, mill	lb.	—	Nom.
P. S. Y.	lb.	.09½	.10
Fatty acids, mill, bbls.	lb.	.10½	.10¾
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03½	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbl. N. Y.	lb.	.06¾	.08¼
Yellow	lb.	.06⅜	.06⅝
Brown	lb.	.06¼	.06½
House	lb.	.06⅜	.06⅝
Bone Naptha	lb.	.06⅝	—
Herring, coast tanks	gal.	.40	.42
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.11¾	—
Compound, tierces	lb.	.11¼	.11½
Middle Western, tierces	lb.	.12¼	—
Neutral, tierces	lb.	—	.13¼
Prime Western, tierces	lb.	.12¼	—
Lard oil, No. 1, bbls.	lb.	.11½	—
No. 2, bbls.	lb.	.11¼	—
Extra bbls.	lb.	.12¾	—
No. 1, bbls.	lb.	.12	—
Winter strained, bbls.	lb.	.13	—
Prime, bbls.	lb.	.15	—
Linseed Oil, boiled, tanks	lb.	.1030	—
Car lots, bbls.	lb.	.1110	—
Less car lots, bbls.	lb.	.1150	—
Less than 5 bbls.	lb.	.1190	—
Double boiled, less than five bbls.	lb.	.1220	.1130
Raw, tanks	lb.	.0990	—
Car lots, bbls.	lb.	.1070	—
Less car lots, bbls.	lb.	.1110	—
Less than 5 bbls.	lb.	.1150	—
Calcutta, bbls.	lb.	.1590	—
Refined, bbls.	lb.	.1140	.1180
Varnish grades, bbls.	lb.	.1160	.1200
Linseed cake, bags	ton	—	42.50
Meal, bags	ton	50.00	—
Menhaden, crude, tanks, Baltimore	gal.	—	Nom.
Light pressed, bbls.	gal.	.71	.73
Yellow bleached, bbls.	gal.	.73	.75
White bleached, bbls.	gal.	.76	.78
Mustard, bbls.	gal.	.95	—
Neatsfoot, cold pressed, bbls.	lb.	.18¾	—
Extra, bbls.	lb.	.12½	—
No. 1, bbls.	lb.	.12¼	—
Pure, bbls.	lb.	.13¾	—
Oleo, No. 1, bbls.	lb.	.10¾	—
No. 2, bbls.	lb.	.10½	.10¾
No. 3, bbls.	lb.	.09½	—
Olive, denatured, bbls. N. Y.	gal.	1.20	1.25
Shipments	gal.	1.18	1.19
Foots, bbls.	lb.	.09¾	.10
Shipments	lb.	.09⅝	—
Edible, bbls.	lb.	2.25	2.40
Palm, Lagos, casks spot	lb.	.07½	—
Shipments	lb.	.07⅜	—
Niger, casks, spot	lb.	07⅛	—
Shipments	lb.	.07	—
Palm Kernel, pkgs.	lb.	.07½	.07¾
Tank cars	lb.	—	.07¾
Peanut, crude, bbls.	lb.	.11½	—
Mills, tanks	lb.	.08½	—
Refined, bbls.	lb.	.84	.85
Perilla, bbls.	lb.	.13½	Nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.04	1.06
Refined, bbls.	lb.	.83	.85
Red Oil, distilled, bbls.	lb.	.10⅜	.10⅞
Tanks	lb.	.09½	—
Saponified, bbls.	lb.	.10⅜	.10⅞
Tanks	lb.	.09½	—
Salmon, coast, tanks	gal.	.44	.45
Sardine, coast, tanks	gal.	.45	—
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.11¾	.12
Orient, coast tanks	lb.	.08¾	.09
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15¼	.15¾
Triple pressed, bags	lb.	.17¾	.18¾
Stearine oleo, bbls.	lb.	.09¾	.10
Tallow, edible, bbls.	lb.	.08	.08¼
City extra, works, loose	lb.	.07	—
Special, works, loose	lb.	.06¾	—
Tallow oil, acidless, bbls.	lb.	.10¾	—
Tanks, N. Y.	lb.	.10½	—
Vegetable tallow, coast, mats	lb.	.08⅛	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Educational Cooperation

(*From Page* 25)

every member of the Texas Cotton Seed Crushers' Association is heartily and enthusiastically behind the program at the college exemplified by the association placing at the disposal of the college a complete cotton seed oil mill where we take the seed from its crude form to the finished products lint, hulls, hydrogenated oil and soap. This is the only mill operated by an educational institution for the training of college graduates in Chemical Engineering. Next year we have available six graduate fellowships of $600.00 each to assist students to pursue graduate work in the field of cotton seed oil mill operations by which we expect to demonstrate to the cotton seed oil interests that the basis of industrial progress is research.

The College also conducts a ten day summer short course for cotton seed oil mill operators which has met with an enthusiastic reception shown by the large attendance at the first meeting last year. It has been impossible for the department to meet the demand for our graduates in Chemical Engineering although we have a registration of two hundred and eighty one in the four year course. We also place a large number of our undergraduate students in the industries during the summer vacation months in order to assist them to meet expenses the following year and obtain a broader view of the industrial possibilities.

I want our students to get a place in the mills or in the refineries so they come in practical touch with operation of a cotton seed crusher or with the refining side of the cotton seed oil business. These men do not ask favors of anybody. They do not wish white collar jobs; they do not want any one to say they are college men; but they are just the ordinary man on the job. You know, sometimes we look at a college man as a man who is stuck up and will not do labor, but I want to tell you that the A. & M. College graduate is not the man that is afraid to wear the overalls, as long as there is an opportunity to learn and a possibility of advancement. I hope you will realize that the A. & M. College of Texas is trying to function as a part of industry and not apart from industry. We are always open to suggestions and we want your advice. We do not think our work is perfect. We see defects which we hope to correct in time, and we shall all work together on the firing line to attack and solve the many problems on the rocky road from the laboratory to the plant.

Foreign Trade Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces that its representatives in all parts of the world have forwarded the following trade inquiries of interest to our readers. In writing the Bureau in reference to any of these inquiries please mention that you saw it in *Oil & Fat Industries*.

No.	Location	Material	Purchase or Agency
38858	Oslo, Norway	Cottonseed Meal	Agency
38848	Dusseldorf, Germany	Lard	Agency
38849	Montevideo, Uruguay	Soybean Oil	Agency
38553	Montreal, Canada	Coconut Oil	Both
38677	Melilla, Morocco	Lard	Agency
38611	Bolzano, Italy	Lard	Purchase
39068	Bombay, India	Tallow, Mutton	Both
38973	Strasbourg, France	Lard and Industrial Oils	Both

Frank Honicker, Executive Secretary of the Mayonnaise Products Manufacturers Association of America, urges all members to bear in mind the Fourth Annual Convention of the Association, to be held at the Traymore Hotel, in Atlantic City, October 28 to 30, 1929. President C. P. McCormick promises a lively program which will be of interest to every member.

Margarin production in April, 1929, shows a substantial increase over the 1928 total for the same month, according to figures released recently by United States Bureau of Internal Revenue:

	Pounds	
	April, 1929	April, 1928
Uncolored margarin	27,237,173	22,989,710
Colored margarin	1,466,441	1,300,807
Totals	28,703,614	24,290,517

Attempts of a group of manufacturers of colored cooking compounds to enjoin the Bureau of Internal Revenue from collecting a tax of 10 cents per pound on their products under the oleomargarin law have met with failure in the Supreme Court of the District of Columbia. The court granted three temporary restraining orders against the bureau, but dismissed them on argument and refused to grant injunctions pendente lite.

The controlling interest in Food Products, Inc., has been reported purchased by Gelfand Manufacturing Co.

Notes of the Industry

Standardization Progress

WHILE some manufacturers of steel barrels and drums are finding it necessary to make certain special sizes, the degree of adherence to the simplified practice recommendation covering these commodities is quite high and on the upward trend, according to Ray M. Hudson, Assistant Director of the Bureau of Standard's in charge of the Commercial Standards Group. In 1925, a total of 84 per cent. of the total steel barrels and drums produced by the acceptors of simplified Practice Recommendation No. 20—Steel Barrels and Drums—were in accordance with the simplified list of sizes. In 1926 the percentage had increased to 89 per cent.

The steel barrels and drums industry came to the Division of Simplified Practice of the Bureau of Standards, for assistance in 1924. A general conference was held on March 26, of that year, and the simplified practice recommendation, now known as No. 20—Steel Barrels and Drums, was adopted. The original recommendation listed 24 sizes, after an elimination of 42 sizes. At the request of the Standing Committee of the industry, a second general conference was held on December 7, 1927, and one size of drum added to the list.

Exports of sesame seed from China to the United States during the first two months of 1929 amounted to 7,046,430 pounds, valued at $300,186 as compared with 2,217,600 pounds and $110,939 for the same period of 1928. The exports of chinese wood oil amounted to 18,434,785 pounds with a value of $2,457,561, while in 1928 the United States imported 12,299,181 pounds valued at $1,673,143. Exports of vegetable tallow amounted to 3,097,720 pounds, valued at $244,969 as compared with 1,173,715 pounds with a value of $85,449 in 1928 during the same period.

Procter & Gamble Company has filed a complaint with the Interstate Commerce Commission regarding the freight rates on cottonseed oil from Texas, points to Seattle and Tacoma, Washington.

J. W. Daniels, Chairman of the Board of the Archer-Daniels-Midland Company, linseed crushers, was a recent visitor to New York, having arrived on the *Leviathan* from Europe enroute to his home in Minneapolis.

Misbranding Violations

DURING the year ending October 1, 1928, shipments of adulterated and misbranded olive and salad oils totaling over 4800 gallons were seized under the Federal Food and Drugs Act, according to an announcement by W. M. R. Wharton, Chief of the Eastern District, covering activities of the Atlantic Seaboard stations. The principal types of violation, according to Mr. Wharton, were volume shortage, adulteration with cheaper oils than those indicated on the labels, and deceptive designs and labels, calculated to mislead the purchaser as to the origin, character and quality of the contents.

The steamer *Doric* of the White Star Line recently discharged 750,000 pounds of refined cottonseed oil, which is stated to be the first imported by water at the Port of Montreal. It was ascertained from the consignees that the shipment originated in Egypt and was transshipped at Liverpool. The buyers state that it was not certain whether there will be further shipments, as the acceptance of this order was merely a question of slightly lower prices than could be obtained elsewhere.

Light rainfall during the winter months in the Malaga section is expected to have a slightly detrimental effect on olive oil production in that region this season although it is somewhat early to make reliable estimates. According to American Consul Brady at Malaga, in a recent report from that city dated April 30, 1929, the carry over at the opening of the present season was at least 300,000 metric tons giving Spain, on the strength of all this holdover stock, an exportable surplus. Heavy shipments out of the country in the near future are not considered probable, although if the value of the peseta continues low, and there are reports of unfavorable crop conditions from elsewhere in the Mediterranean Area, it may have the effect of increasing exports somewhat.

A newly organized corporation, Ivanhoe Foods, Inc., has taken over the entire mayonnaise business and plant of the C. G. Meaker Company. Ellis R. Meaker retains his executive connection with the new corporation.

OIL & FAT INDUSTRIES

The Editor's Page

A Field for Standards

IN THESE days of scientific control, mass production and cost accounting, it is almost inconceivable that an entire industry of considerable magnitude can be conducted along the old lines of "Rule of thumb" purchasing. We have constant evidence, however, that such is the case among purchasers of sulfonated oils of all grades.

The manufacturers of sulfonated oils are busily engaged in strenuous "price competition," and most purchasers of these products are ready to listen to any salesman whose story includes a cent or a half-cent lower price than the other fellow's. The methods for determining the grade and quality of sulfonated oils are not at all well defined, so that the salesman who sells 40% total fatty matter oil, describing it as 50% and offering it at bargain rates, is often able to impress the purchaser with the idea that he is being overcharged by competitors, who, on the other hand are actually delivering 50% oil at a fair price for that grade.

Here lies a splendid opportunity for the manufacturers of these oils and for the American Oil Chemists' Society. If the manufacturers will encourage their chemists to join the Society, the day when critical methods of analysis and grading of their products will be adopted will be near at hand. At the same time it would be well for the reputable manufacturers of these products to form a trade association for general elevation of the standards in their industry and for cooperative advertising to inspire confidence in the purchasers of their products.

The manufacture of these products is a legitimate business, and is capable of being conducted along modern lines of frankness and confidence, as all successful businesses are being conducted today.

Free Goods

IT IS a far cry from the oil mill to the counter of the retail store where the finished fatty food products eventually find their way to the consumer, but what takes place in the marketing of any product has an ultimate bearing on those who produce the materials which go to make up that product. Cut-throat competition in the sale of any commodity invariably brings a direct pressure on respective production departments to reduce their costs. One of the time-honored means of helping to reduce production costs is to beat down raw material prices wherever possible.

For years, the custom of giving away so many bottles or cans of this or that product with each case ordered by the dealer has been in vogue. The "free goods offers," so-called, have been almost numberless. The object, of course, has always been to increase the size of the order from the individual dealer, and to get him to push the item in question to reduce his thus acquired larger-than-normal stock.

Irrespective of the merits claimed for free goods, the intelligent dealer realizes that there is nothing free in this life. He has found that he gets what he pays for and little else. If he buys too much of an item in order to get the free goods, he pays for the "free goods" nevertheless in time, trouble, and worry in reducing this stock.

The recently announced policy of one of the largest mayonnaise manufacturers in the country to eliminate all free goods, special offers, and other trick sales methods, and to sell all wholesalers at the same list price and no other, is unquestionably a wise step. Giving free goods in any perishable food product to wholesaler or retailer is a sure method of overselling, causing too large stocks, prolonged storage and possible deterioration before reaching the consumer. This applies to shortening, cooking oils, margarin, and similar products as well as to mayonnaise. The competition which is also engendered reflects back all the way to the supplier of the raw materials.

Free goods are merely a subterfuge and a cause of endless trouble to dealer and manufacturer alike. They have no place in a sensible merchandising plan.

Contracts

INNUMERABLE raw and finished products are sold on contracts extending over a period of months or a year. Most of these contracts carry a flat price per pound, ton, or gallon, and some of them protect the buyer against decline in price. That is, if the market goes below the contract price, the goods covered by the con-

tract are billed at the lower figure. Some contracts carry a minimum and maximum quantity; that is, the buyer agrees, for example, to take not less than say 40,000 pounds and can take up to 50,000 pounds if he sees fit.

A study of many manufacturers' contracts would indicate that the name "contract" is distinctly a misnomer. As far as we can see, most of them are more in the nature of a free insurance policy for the buyer. If the buyer contracts for compound at a price, and the market advances, the buyer will probably take his full maximum quantity and dispose of the excess. If, however, the market has declined, he may or may not take his minimum quantity, and if he does, he takes it at the lower figure where the contract permits. If, coincident with a market decline, there comes possibly a rise in raw material costs, the supplier is faced with a twofold problem, that of paying more for raw material and that of meeting a lower market price for the finished article. This is not an unusual occurrence; it is quite common in many industries.

Where there is a speculative or fluctuating market for raw materials, there most certainly should be some factor in the price of finished goods to compensate for the fluctuations. In other words. the price of an article should be based on the cost of the raw material in the article plus a decent margin of profit. A contract made in January at a flat price for delivery over the year cannot consider intelligently the possible cost of raw material six or eight months later. No matter what the product, whether sold on contract or not, its selling price should be based on cost at the time of its manufacture. Some products are sold on contract today on a sliding price scale, based on the average cost of raw materials. Some soaps are sold at a price which is moved up or down from an agreed figure according to the previous monthly average prices of cocoanut oil or tallow. This seems to be a sensible arrangement, an arrangement through which the business of the supplier cannot suffer severe damage as the result of some crazy movement in raw material prices. It is a type of arrangement which is certainly to be preferred to the contracts now in vogue in so many industries. A sales contract should be a two-way, two-sided agreement, not merely an insurance policy for the buyer.

Exports of copra from Ceylon to United State during 1928 amounted to 10,333,932 lbs., with a value of $569,414, as compared with 3,472,140 lbs., worth $185,927, during 1927.

Herbert B. Battle

IT IS with deep regret that we announce the death, on July 3, 1929, at Montgomery, Alabama, of Herbert B. Battle, Founder and President of The Battle Laboratory, and Past President of The American Oil Chemists' Society. He will be deeply mourned by his many friends and associates among the members of the Society and elsewhere.

Dr. Battle was born at Chapel Hill, N. C., on May 29, 1862, the son of Dr. K. P. Battle, who was for many years the President of the University of North Carolina. Dr. Herbert Battle graduated from the University in 1881, taking his doctor's degree in 1887. He was for ten years Director of the North Carolina Agricultural Experiment Station. He moved to Montgomery in 1903, and in 1906 organized the Battle Laboratory, which he conducted most successfully until the time of his death. In addition to being one of the Founders of the American Oil Chemists' Society, Dr. Battle was a Founder of the Alabama Anthropological Society, and a member of the Rotary Club and of the Executive Committee of the Boy Scouts of Montgomery. He enjoyed the affection and esteem of his associates in every walk of life, not only in the city where he made his home, but throughout the entire country among those, particularly oil chemists, who were so fortunate as to know him.

Exports of palm oil from Lagos, Nigeria to United States during 1928 totaled 5,886,508 lbs., valued at $438,902, according to R. F. Fernald, American Consul at Lagos.

The New York offices of W. H. Jasspon, President of the Jasspon mills, operating several cottonseed oil mills in the South, are now located at 205 East 42nd Street.

Jurgens' Oliefabrieken, of Zwyndrecht, Netherlands, which has been controlled for some time past by N. V. Margarine Unie, the Dutch-British margarine combine, will hereafter be known as "N. V. Mattschappy tot Exploitatie der Vereenigde Oliefabrieken Zwyndrecht."

Position Wanted: Wanted, position as manager or superintendent of oil refinery by man thoroughly experienced in the manufacture and refining of cottonseed, peanut, and other oils, manufacture of lard compound and salad oils. Will furnish satisfactory references as to character and ability. Reply to **Box D24**, c/o of *Oil and Fat Industries,* 136 Liberty Street, New York.

American Reindeer Fat

A Contribution from The Oil, Fat and Wax Laboratory, Bureau of Chemistry and Soils, Department of Agriculture

By WALTER F. BAUGHMAN, GEORGE S. JAMIESON, and R. S. MCKINNEY

THE reindeer industry of Alaska which had its beginning many years ago ("Reindeer in Alaska, U. S. Dept. Agric. Bull. No. 1089 (1922), by S. Hadwen and L. J. Palmer) through the efforts of the U. S. Bureau of Education, has made rapid progress in its development during recent years, with the result that increasing quantities of the meat are sent to this country, where it is distributed through the meat markets in various states, particularly those of the Northwest. In view of the growing importance of the reindeer meat industry, primarily to the people of Alaska, a cooperative study of the composition, palatability, and methods of preparing and cooking the meat has been undertaken by the Bureaus of Animal Industry, Home Economics, and Biological Survey, of the Department of Agriculture.

The only reference to a previous examination of reindeer fat that could be found in the literature was that of Tistschenko (Zeit. angew. Chem. 1900, 167), who reported that the fatty acids from a sample of the fat which had an iodine number of 35.8 and a saponification value of 194.7 consisted of 60 percent of stearic acid, 1.5 of palmitic and 38.5 of oleic acid. The present investigation shows that the proportions of palmitic and stearic acids are entirely different from those that he reported.

These samples represent the fat of reindeer produced under the usual Alaskan conditions. It is known that the character of the feed may influence the nature of the fat deposited in animals. Without a study of the feed of reindeer and its influence on the composition of reindeer fat it is impossible to say to what extent the differences observed in these carcasses are the result of the feed or are inherent characteristics of the reindeer.

The five samples of reindeer fat listed below were taken from different parts of two carcasses of varying degrees of fatness, which were furnished by Mr. Loman of the Loman Reindeer Corporation of Alaska for the proposed study.

Sample I. Combined kidney fat from carcasses 351 and 352

Sample II. Combined rib fat from carcasses 351 and 352

Sample III. Combined chuck fat and brisket fat from carcass 351

Sample IV. Combined fats from rump, buttock, and flank of carcass 351

Sample V. Combined fats from loin end and short loin of carcass 351

TABLE I

Reindeer Fat

Chemical and Physical Characteristics

Samples	1	2	3	4	5
Softening point °C.	41.	41.	40.	40.	40.
Melting point °C.	47.4-48.6	46.0-46.6	46.0-46.2	45.8-46.0	46.0-46.6
Specific gravity $\frac{40°}{25°}$		0.8993	0.8981	0.8993	0.8981
Refractive index, 60°	1.4510	1.4510	1.4510	1.4510	1.4510
Acid value	8.6	2.0	3.7	2.7	3.7
Saponification value	194.3	199.2	197.5	197.3	197.6
Unsaponifiable matter (%)		0.4	0.4	0.4	0.4
Iodine number (Hanus)	34.3	34.5	39.4	37.1	33.7
Acetyl value		5.0	6.3	7.3	8.0
Reichert-Meissl number	0.3	0.0	0.0	0.1	0.1
Polenske number	0.3	0.4	0.4	0.4	0.5
Saturated acids (%)		59.2	53.6	55.8	59.9
Unsaturated acids (%)		35.9	41.4	39.4	35.2
Iodine number of unsaturated acid fraction		90	90	90	90

The important chemical and physical characteristics of the samples are recorded in Table I (Sample I was small and therefore as thorough an examination could not be made of it as of the others). The methods used for these determinations were the same as those employed for the examination of other fats and oils in this laboratory—Oil & Fat Ind. *5*, 202 (1928); *4*, 131 (1927); J. Am. Chem. Soc. *46*, 775 (1924).

The melting points, specific gravities, iodine numbers, saponification values and percentages of saturated and unsaturated acids of the different samples vary but little and resemble closely the same characteristics of beef tallow. (J. Agric. Research *26*, 77, (1923) The acid values show that the fats had undergone a slight degree of hydrolysis before they were examined. The acetyl values also are due to this hydrolysis and do not indicate the presence of hydroxylated fatty acids. The low Reichert-Meissl and Polenske numbers are similar to the results obtained with other animal tallows and indicate that the fats do not contain volatile fatty acids in appreciable amounts. The iodine numbers of the unsaturated acid fractions indicate that they consist of oleic acid.

The saturated acids were separated from a portion of Sample V by the lead-salt-ether method and esterified with methyl alcohol. This mixture of methyl esters, which weighed 108 grams, was fractionally distilled in a vacuum. A preliminary distillation divided the mixture into six fractions, which were all redistilled (the manner of making this distillation is described in the references given above). The fractions were analyzed, and their composition was calculated from the results. In order to test the correctness of the deductions made from these analytical data, the free fatty acids were recovered from the methyl ester fractions and the constituent acids were isolated by fractional crystallization from ethyl alcohol. Their identities were established by their melting points and by observing whether or not these melting points were lowered when the acids were mixed with equal quantities of the respective acids which they were suspected of being, the purities of which had been established previously by elementary analyses. In this way the percentage composition of the saturated acid fraction was found to be as follows: Myristic, 10.6; palmitic, 55.6; stearic, 32.7; and arachidic, 1.1 per cent.

The composition of Sample V was calculated from the results obtained by analysis and is recorded in Table II. It was considered that the percentage composition of the samples could differ but little because their chemical and physical characteristics show only slight variations and, therefore, it was regarded as unnecessary to determine the composition of the other samples.

The presence of arachidic acid and the large quantity of myristic acid in reindeer fat is noteworthy. Arachidic acid has not been found in the fat from domestic animals, except those that have been extensively fed on peanuts. Although the majority of the reports on the composition of beef tallow do not mention myristic acid, Myddleton and Barry (Fats; Natural and Synthetic, p. 111) found 2 and 2.5 per cent, respectively, in Australian and South American tallows. In regard to lard, Elsdon (Edible Oils and Fats, p. 356) states that at the present time the presence of acids lower in the series than palmitic acid must be considered doubtful.

The proportions of palmitic, stearic, and oleic acids which have been found in this sample of reindeer fat are similar to those reported for beef tallow.

TABLE II

Composition of Reindeer Fat
(Sample V)

		Per Cent
Glycerides of	Oleic Acid	36.8
	Myristic "	6.7
	Palmitic "	35.0
	Stearic "	20.5
	Arachidic "	0.7
Unsaponifiable matter		0.4

Foreign Trade Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces that its representatives in all parts of the world have forwarded the following trade inquiries of interest to our readers. In writing the Bureau in reference to any of these inquiries please mention that you saw it in *Oil & Fat Industries.*

No.	Location	Material	Purchase or Agency
39089	Habana, Cuba	Coconut oil, Refined	Agency
39101	Bremen, Germany	Lard	Agency
39176	Copenhagen, Denmark	Olein	Both
39339	Berehovo, Czechoslovakia	Oils and fats for soapmaking	Purchase
39341	Naples, Italy	Corn and cottonseed oil for soapmaking	Agency

It is reported that Lever Brothers plan to build a new $5,000,000 plant at Hammond, Ind., on a 13-acre plot fronting on the lake shore.

Norwegian Whaling Industry in Transition Era

More Efficient Methods Are Being Adopted Because of Decline in Yield in South Seas

CHANGING conditions in the whaling industry have led to the adoption of the floating refinery system, or the location of land refineries at places convenient to the whaling grounds by the Norwegian whale fishing companies which operate in far Southern waters.

These new refineries replace those which were formerly located at the home ports of the fishing vessels. Pelagic, or deep-sea fishing is also being adopted more and more by these operators. The pelagic fishing offers the material advantage that the whaling expeditions follow the whales, whereas the companies which fish from the ports naturally have a more limited scope of activity, and therefore not such possibilities of a good harvest as the pelagic companies.

Formerly the difference was specially noticeable on a comparison of the harvest result between the companies which have concessions in South Shetland and the non-concessioned pelagic companies, which at the same time fish in the region of the Falklands, for which reason individual Shetland companies already a few years ago began to transfer their activity. Also in the case of Georgia, the difference seems to have asserted itself in regard to part of the present season, but this may be an accidental matter, and one should not be too quick to draw conclusions as to the future, because it is shown that fishing there is proceeding very well.

Keener Competition

The transition to pelagic fishing has contributed toward the starting of many new companies. With the former method of working the starting of new companies was, so to say, an impossibility, as the number of concessions in British possessions was limited, whereas now fishing is carried on independently of foreign States, and where one wishes so long as one keeps outside the three-mile limit. The pelagic system has hitherto conferred great advantage on Norway, but, on the other hand, leading Norwegian operators are not blind to the dangers which accompany the great development of the industry. The expansion is so great that the fleet in 1929-30 will be about double what it was in 1927-28.

In the season of 1927-28 the number of whalers which fished in the South Sea, both Norwegian and foreign, was 80; in 1928-29 the number was 114, and in 1929-30 the number is at least 148. In calculating the latter number the same number of ships as in the past year has been reckoned for the companies already in operation, with the addition of new ships for the companies whose share capital is assured, but no account has been taken of the companies in course of formation.

Stock of Whales

Besides the increase in the number of whalers their efficiency is also much greater than ever before. The question then arises, how long will the stock of whales bear the strain? It is impossible to give any answer, but it is certain that the stock is limited, and so therefore is the number of whales which can be killed yearly without diminishing the stock. It is not known where the limit lies, but if extensions are continued in the present manner, the consequences will soon become very perceptible for the industry.

According to informed opinion in Norway the renumerativeness of whale fishing has been greatly overestimated, and it can therefore be appropriate to point out that in the past four years all the Norwegian Bourse quoted company shares which carry on in the Southern Arctic Sea have yielded to the shareholders an average of about 15 per cent per annum. To offset this return, however, it is shown that a few unfortunate seasons may wipe out the whole of the share capital, as in the case of one, whose capital of 3,000,000 kroner was lost in two adverse years. Fluctuations of the oil market also may have a serious effect on the fortunes of the companies.

The application of the Scientific Oil Compounding Co. at Chicago to have imported perilla oil enjoy the same transit privileges that are accorded to China Wood Oil, and Manchurian Soya Bean Oil, has been favorably decided upon by the Standing Rate Committee of the Western Trunk Lines, effective August 1, 1929.

Olive Oil Analytical Method

PART II

The Use of the Ultraviolet Ray in the Detection of Refined in Virgin Olive Oil

By SIDNEY MUSHER AND CARL E. WILLOUGHBY*

THE first report[1] has emphasized the present need for a means of conclusively distinguishing between virgin and refined olive oils and mixtures of the two. It was also pointed out that although this problem has been successfully attacked in Europe by the use of the ultraviolet, with the exception of a short investigation at the Bureau of Standards[2], nothing has been done in this country to assist in its solution.

The main purpose of this investigation was, therefore, to confirm the work which has been conducted in various European laboratories[3] in connection with the use of the ultraviolet lamp in detecting "refined" in "virgin" olive oil.

The experimental procedure consisted in observing the oils under the light from a quartz-mercury lamp in conjunction with a Corning ultraviolet filter.

The mercury lamp was completely enclosed in a wooden box, the entire inner surface of which was stained a dull black. The radiation was obtained horizontally by fitting the Corning filter into one side of this box—care being taken to eliminate stray radiations. All this work was conducted in a "dark room" so as to facilitate the observations.

The samples of oils were placed in Pyrex glass test-tubes of 15 mm. diameter. These tubes were suspended vertically about eight inches from the Corning filter, and the characteristic fluorescence of each oil was observed against a white background. A white background was employed thruout because it was found to be far superior to any other in detecting very slight differences in fluorescence. (It is understood that by fluorescence we refer to the light reflected from the sample, and not that transmitted.)

The olive oils examined were obtained from every point of production in the Mediterranean districts which constitute the field of production of fully ninety-five percent of the world's olive oil crop. Because of the facilities extended to us through our buying organization, we were able to absolutely authenticate the qualities and treatments of the oils obtained. The virgin olive oils were obtained in most instances directly from the subterranean tanks of the co-operative farm presses, and these samples were checked with original shipments arriving at Baltimore. The samples of refined olive oils were obtained from practically every large edible oil refinery in southern Europe, and we have every proof that the "French refined" and "pulp refined" samples were accurate.

By "French refined" we refer to the ordinary methods of refining and deodorizing treatments given the third and fourth pressings of olive oils which have not been solvent extracted. By "pulp refined" we refer to the oil which has been extracted with the use of carbon disulphide from the "marc" or hulls of the olives after the usual steam extraction, and subsequently refined and deodorized in the ordinary manner.

It was observed that in some instances of fluorescence the oils were opalescent in appearance under the ultraviolet; otherwise, they were perfectly clear.

"Virgin" Oil Results

The fluorescences observed in the examination of virgin olive oils are shown in the following table:

Type Oil	Origin	Age	Fluorescence
Aragon	Spanish	8 months	Deep orange
Bari	Italian	10 "	" "
Sousse	Tunisian	7 "	Canary yellow
Sfax	Tunisian	7 "	" "
Infigiable	Tunisian	7 "	" "
Bari	Italian	7 "	" "
Andria	Italian	2 "	Deep yellow
French Blend	—	19 "	Yellow (oil opalescent)
Virgin*	Unknown	14 years (Approx.)	Yellow (oil opalescent)
Puglia	Italian	1½ months	Canary yellow
Basilicata	Italian	1½ "	" "
Bitonto	Italian	1½ "	Yellow (oil opalescent)

* Authentic *virgin*, packed about 1914; rancid; free fatty acid 3.74%.

Each virgin oil upon analysis in the laboratory conformed to the physical and chemical requirements for a pure olive oil.

The fluorescence exhibited by a refined olive oil is characteristically bluish-violet; this color

*From the research laboratory of—
The Pompeian Corporation, Baltimore, Md.

is the same irrespective of source, and this fluorescence is absolutely incomparable with that of any virgin olive oil.

It was found very difficult to approximate the percentage of refined oil in virgin olive oil in mixtures containing more than 65% of the former, as the bluish-violet fluorescence was observed to have reached a maximum intensity at this concentration of refined oil. However, Stratta and Mangini[4] report the utilization of the spectrophotometer to detect the presence of virgin oil to 1% in mixtures with refined oil. This is possible from an examination of the fluorescence spectrum which, when virgin oil is present, is characterized by a red band of 669 millimicrons.

On the other hand, it was found that the presence of a refined oil could be easily detected in mixtures down to 5%. It was difficult, however, to clearly distinguish even a slight bluish-violet tinge in the fluorescences exhibited by mixtures containing under 5% of refined oil. This observation was repeatedly verified and was facilitated by comparison of the mixture in question with the virgin oil contained therein. We attribute this difficulty to the intensity of the fluorescence from the virgin oil which obscures that of the refined oil.

Stratta and Mangine[4], however, report that with their method of analysis, they can detect a change in the fluorescence of virgin oil upon the addition of only 1% refined oil.

"Pulp refined" olive oil was identical in color under the lamp with ordinary refined oil.

We feel justified in offering as an explanation of the fluorescences observed of the different types of untreated and treated oils that the distinguishing feature is a direct function of the chlorophyll content. We base this assumption upon the following facts:

Other Oils Examined

Authentic samples of crude cottonseed oil were examined under the lamp. Crude, unfiltered cottonseed oil showed no fluorescence and appeared very dark brown in color; crude cottonseed oil filtered thru paper (unbleached) possessed a deep yellow fluorescence exactly comparable with a virgin olive oil; crude cottonseed oil filtered thru earth (bleached) showed the same fluorescence as a refined olive oil.

We have found that all available refined vegetable oils, including cottonseed, peanut, and sesame oils, cannot be distinguished under the lamp from a refined olive oil. It is understood, of course, that all refining treatments include the use of a bleaching agent and subsequent deodorization, which necessarily modifies the original chlorophyll content.

A sample of virgin olive oil which originally showed a canary yellow fluorescence was heated to 300°C., maintained at this temperature for thirty minutes and then allowed to cool to room temperature. This oil in ordinary daylight had darkened considerably in color and under the lamp it took on a fluorescence of a 5-10% mixture of refined in virgin olive oil.

Numerous samples of second pressing natural olive oils showed under the lamp a deep reddish-orange fluorescence not comparable with any fluorescence noted above. The oils obtained from second pressure have naturally a higher chlorophyll content, as is evidenced by the fact that they are of a much deeper hue after this extraction than those of the first pressure.

The California virgin olive oils show a fluorescence which is very similar to that of the second pressure oils of European origin. We infer from this that the methods of extraction of the California oils have progressed to the point where a much greater percentage of the oil may be extracted from the fruit through first pressing than can be obtained in Europe. Therefore, on this basis we can account for the difference between the fluorescence of a European virgin oil and that of a California virgin oil. This is presumably the main issue that has prevented the continuation of the short investigation which was conducted at the United States Bureau of Standards[2].

We have found the ultraviolet lamp of value in examining our shipments of olive oil as to purity, and we are certain that if other manufacturers and importers will substantiate our results, they, too, will benefit.

Summary

1. The ultraviolet lamp has proven successful in the detection of refined in virgin olive oil down to a limit of 5% of the former. The results, however, are doubtful in mixtures containing under 5% of refined oil.

2. It is our belief that the chlorophyll content determines the characteristic fluorescence of an oil, and that the bluish-violet fluorescence of a refined oil is due to a change in the chlorophyll constitutents brought about by the refining process.

BIBLIOGRAPHY:

[1] Sidney Musher: "Olive Oil Analytical Method. The use of the Ultraviolet Ray in the detection of refined in virgin olive oil". Part I. Oil & Fat Industries, December, 1928, pages 356-7.

[2] "Fluorescence as a means of detecting the admixture of refined in unrefined edible olive oil" A report of the Bureau of Standards, published in the Technical News Bulletin, Nov. 1927.

[3] Bibliography, Oil & Fat Industries, p. 357, December, 1928.

[4] R. Stratta and A. Mangini: "Sulla Fluorescenza degli olii d'oliva italiani alla luce di Wood". Giornale di Chim. Ind. ed Appl. 10, 205-7, 1928.

New Synthetic Methods in Chemistry of Fats

IN the case of fats there are three kinds of synthesis, viz:—Preparation both of fatty acid and glycerine by synthesis; secondly, fats with fatty acids and glycerine, and thirdly, fats and oils are transformed to make products of greater industrial value.

Endeavors have been made to obtain integral synthesis by chlorination of the hydrocarbons of the paraffin series and introduction of carboxyl by the Grignard method. On the other hand paraffin was directly oxidized into fatty acids. These methods have lost interest since the renewal of supplies of natural fats after the war.

The synthesis of fats with fatty acids and glycerine gave interesting results. Glycerine being a trivalent alcohol, mono-, di-, and triglycerides can be made, not only of a single acid, but also of mixed glycerides containing various acid radicals.

The number of derivatives of this order is somewhat great, as the diglycerides and, for greater reason, the triglycerides can exist in several isomers, considering the difference between the third hydroxyl of the glycerine and the two others. These syntheses were specially studied by Grün, who prepared mixed glyceric esters from monohydrochlorine. After esterifying this last with a fatty acid and replacing chlorine with hydroxyl by conversion into a nitroso compound he was able to esterify this hydroxyl with a different acid to the first. Other methods of synthesis of this kind have been proposed by Emil Fischer and Bergmann.

The direct conversion of fats into others of superior quality is much more important than the preceding processes. The principle of this method dates back to Berthelot, who found that triacetin heated with glycerine gives diacetin and monoacetin, the glycerine being esterified at the expense of one of the acid radicals.

By treating fats with an alcoholic hydrochloric solution, fatty esters of the alcohol utilized are obtained. Thus in Germany during the war alimentary fats were made, but their use was on a small scale. It appears that these esters are better than ordinary greases for nourishing leather.

This method for exchange of acid radicals serves particularly to lower the melting point of fats, such as mutton, pressed tallow and certain hardened fats. These fats contain considerable quantities of tristearin-palmito-distearin and certain glycerides of behenic acid (hardened fats). Their high melting point makes them unfit for alimentation. By replacing the higher fatty acids with others of less molecular weight or converting these fats by reaction with glycerine into mono- and diglycerides, their melting point can be lowered. In practice these transformations are made in presence of catalysers. The mono- and diglycerides obtained can be esterified in turn and give fats with mixed fatty acids.

Norman obtained similar results by the action of acids on glycerides. Heating tristearin, for example, with butyric acid butyrodistearin and free stearic acid are produced. Thus special glycerides can be made, those, for example, with an odd number of carbon atoms. Fats of this kind eaten by diabetics are to be found in the market under the name of "Intarvine."

Among the fats, castor oil presents interesting possibilities of new synthesis. It is easily transformed by hydrogenation into triglyceride of 12-oxystearic acid. This glyceride gives, by decomposition, the glycerides of estolides, viz., condensed fatty oxyacids in which the carboxyl of a molecule is esterified by the carboxyl of another. These compounds are usefully employed as special lubricants, and to soften leather, textiles, etc.

Condensation of the fatty acids is already obtained by prolonged heating. Compounds are obtained with molecular weight of 12,000 and, it appears, up to 20,000. Having obtained the acid with the required degree of condensation it is esterified with glycerine.

Grün obtained glycerides of estolides by directly heating the fat in presence of catalysers, like tin, which produce internal esterification. This same author in collaboration with others, succeeded in synthetically producing superior alcohols of waxy nature by treating fatty acids with iron, at a temperature of 360°C., and then heating the ketones thus produced with alcohol and soda lye.

These new methods of synthesis enable manufacture of the best neutral fats from waste fats previously refined by modern methods.—*Rev. Prod. Chimiques.*

The Linseed Trade of British India

A Communication from the Foodstuffs Division, Department of Commerce

BRITISH INDIA is the third largest producer of linseed in the world, being exceeded only by Argentina and the United States, and is the second largest exporter, Argentina ranking first.

The feature of the cultivation of linseed in India is that it is cultivated entirely for its seed and not for its fiber. It is sown either by itself or as a mixed crop and the plant is allowed to develop a branching habit of growth, which greatly lessens its value for fiber.

In 1904-05 nearly 560,000 tons of seed were shipped and India practically monopolized the world's trade, but thereafter the increased competition of Argentina, United States, Canada, and Russia had, when the war broke out, reduced India's share of the trade to 25 per cent. Indian linseed is preferred, however, to that of any other country.

Producing Areas

The principal producing areas are the Provinces of Bihar and Orissa, United Provinces, Central Provinces, Bengal and Bombay. The area under cultivation aggregates ordinarily between 3,000,000 and 3,500,000 acres, inclusive of a mixed crop of about 600,000 acres in the United Provinces, but in years of scarcity the total is much reduced. In a good year the outturn of linseed from pure and mixed crops exceeds 500,000 tons, and the quantity available for exports is in the neighborhood of 400,000 tons. A certain quantity of linseed is crushed in India but the oil obtained apparently does not equal that manufactured abroad, for the railways and other large consumers of linseed oil find it necessary to import their requirements.

Agricultural Statistics—Importance of the Monsoon

Linseed is sown in India between the months of August and October. It is harvested between the months of January and April. The first, second, and final Government forecasts on the linseed crop are published on January 1, March 15, and June 1, respectively. The latest estimated area was placed at 3,352,000 acres, giving an estimated yield of 351,000 tons.

Agricultural statistics and forecasts of important crops are prepared and published by the Government of India. It is generally agreed that the annual figures of areas sown with the various crops are, on the whole accurate, and that they compare in this respect very favorably with those published by other countries. There are difficulties even here, however, mainly arising from the absence of a subordinate staff in permanently settled tracts. In Madras village officers in these tracts act as a reporting agency, but in Bengal and Bihar and Orissa, where no such officers are available, reliance is to be placed mainly on reports from the police. Wherever possible, assistance is obtained from officers of the revenue department and from district agricultural officers and non-official agricultural correspondents. The information thus collected is forwarded through the subdivisional officers to the district officer, who has the discretion to reject or amend reports in the light of his own knowledge or experience. These reports are admittedly often mere guesses. The Government has considered whether any steps could be taken to obtain more accurate information, and, while admitting the unsatisfactory character of the information obtained, has taken the view that no improvement could be effected without incurring expenditure which would not be justified by the results to be obtained.

The outstanding factor affecting the sowing, growing, and harvesting of linseed—as other crops in India—is the monsoon, or seasonal rainfall, which is quite uncertain. Cultivators are much more dependent in India on rainfall than those in other parts of the world, because of the general lack of irrigation. The cultivation of linseed and other crops is also affected by insect pests and diseases. All of these factors are closely followed by responsible merchant houses in India, which are important factors in the export trade, and their cable reports to consuming and market centers like London and New York can be fairly well relied upon.

Principal Markets—Methods of Sale

Most of India's trade in linseed is with the United Kingdom, but France, Italy, and Belgium take large quantities. Out of a total of 308,000 tons exported in 1925-26, shipments to the United Kingdom accounted for 111,000 tons, France 62,000 tons, Italy 39,000 tons, and Belgium 32,000 tons. Yellow and brown varieties of linseed are commercially recognized. Most of the crop marketed is of the brown variety, which is graded into "bold," "medium," and "small." Bombay exports chiefly "bold" and "small," and Calcutta the "medium." Yellow linseed is exported from Bombay only and is often sold with an admixture of "bold brown," which may run as high as 80 per cent.

Linseed is generally shipped throughout the year, but the busy season is from May to July. The unit of sale in Calcutta is the bazaar maund of 82¼ pounds, and in Bombay the hundredweight of 112 pounds. Sterling quotations are for the ton of 2,240 pounds net, landed terms or c. i. f. Shipments are made from Calcutta in single B twill bags of 164 pounds, or double E bags of 186 pounds net. In Bombay the unit of weight ranges from 168 to 196 pounds gross.

Most firms maintain their own buyers in the upcountry districts, who advance funds through one or more middlemen to the cultivators against contracts for their standing crops. These district field representatives are in constant touch with their head offices at Karachi, Bombay, and Calcutta, and keep them posted by wire as to the weather and crop conditions and other factors affecting market trends. The Indian port offices of these firms then cable their market reports to their own offices or connections in Europe, London, and New York, and competition between them is sufficiently keen to permit ultimate buyers to rely upon their reports as giving their best opinions of the market.

Production and Exports

The following table gives production and exports of linseed from India for a term of years:

BRITISH INDIA'S PRODUCTION AND EXPORTS OF LINSEED

Year	Production Bushels	Exports Bushels
1909-1913, average	20,578,000	13,780,000
1923	21,320,000	14,107,000
1924	20,040,000	15,115,000
1925	16,040,000	14,022,000
1926	16,080,000	7,338,000
1927	16,280,000	8,531,000
1928	14,040,000	[1] 5,350,000

[1] 10 months, January to October.

Cacao Butter Analytical Method

A new method for the detection of cacao butter adulteration by means of benzoic peroxide involves treatment of the sample with a chloroform solution of benzoic peroxide, as follows: To a solution of two grams of the sample in 10 cc. of chloroform and 40 cc. of reagent prepared as below, the content of which has been carefully determined, so that for 5 cc. about 12-13 cc. of 0.1 N sodium thiosulfate will be consumed. The temperature should remain constant at about 20° throughout the determination. From time to time remove 5 cc. of the chloroform solution to an acidified potassium iodide solution and after vigorous agitation titrate the precipitated iodine with 0.1 N sodium thiosulfate solution. The end point is reached when no further recession in the amount of precipitated iodine is observable, at which time there should be still an excess of benzoic peroxide present. Curves constructed on values obtained in the examination of samples of pure cacao fat and other fats likely to be used in adulteration show two possible groups of fatty admixture, 1. of fats having greater and 2. of fats having less unsaturation than cacao butter. The values are based on time of reaction and amount of benzoic peroxide consumed in terms of sodium thiosulfate. The relative position of the curves of samples in question to that of pure cacao butter permits estimation of the extent of adulteration. *Preparation of reagent*: Dissolve 10 grams of benzoic peroxide in 100 ml. of ether-chloroform mixture (1:1) and cool to 0°; add an equally cooled solution of 1 gram sodium in 20 ml. of alcohol in a thin stream with proper agitation, immerse in ice water for ½ hour, then dissolve the magma in 300 ml. of ice water, separate the mixture in a separatory funnel, acidify with dilute sulfuric acid and extract the benzoic peroxide with two 150 ml. portions of chloroform. Dry over sodium sulfate, filter and adjust by addition of more chloroform until 5 cc. is equal to 12-13 cc. of sodium thiosulfate. *Pharm. Ztg.* 74, 384-5 (1929) *Editor's Note*: Any of our readers who attempt to duplicate this procedure are urged to exercise the most extreme caution in the addition of sodium solution to peroxides.

Preparations which disperse in water are prepared by milling organic substances which are not readily soluble in water with a dispersion agent such as soap, for a considerable time. Examples of the organic substances are aminoazobenzene, dianisidine and phenol.—Swiss Pat. No. 128,441.

American Vegetable Oil Trade

Average Annual Value of United States Foreign Trade in Vegetable Oils and Fats During Last Five Years Exceeds $84,000,000

By E. L. THOMAS, *Foodstuffs Division, U. S. Dept. of Commerce*

THE value of the foreign trade of the United States in vegetable oils and fats has exceeded $84,000,000 annually for each year since 1924. The high in the 5-year period was in 1927—$86,394,386, in contrast to the low of $66,323,221 in 1924. In 1928 the total was $84,440,286, $84,828,576; and in 1925, $84,295,340.

The ratio of exports to imports has ranged from 1 to 7 in 1924 and 1925 to 1 to 9½ in 1928. The value of exports and imports, respectively, was as follows: In 1924, $8,258,980 and $58,064,241; in 1925, $10,637,969 and $73,657,371; in 1926, $8,041,941 and $76,786,635; in 1927, $10,420,784 and $75,973,602; in 1928, $8,979,758 and $75,460,528.

Export Vegetable Oils and Fats

THE feature of our export trade is cottonseed oil, amounting in 1928 to 51,702,246 pounds of crude and refined, valued at $4,656,725—crude representing 41,126,452 pounds and $3,455,567. This figure for crude was surpassed in 1927, but exports for 1928 were well above those for 1924, 1925, and 1926. Canada has been our best customer throughout the past five years, taking 39,084,870 pounds last year, the largest amount in the past five years with the exception of 1927. Mexico, with 2,036,159 pounds, ranked second in 1928. Remaining exports are of no commercial importance.

Last year refined oil exports reached the lowest figure in the past five years. The curve has been steadily downwards, the gradual substitution in the consuming countries of the world of other vegetable oils and retention of greater quantities for consumption of refined cottonseed oil at home. Mexico, almost the sole exception among our larger buyers, increased its imports in 1928 over other recent years. Exports to Germany and the Scandinavian countries have dwindled. Cuba decreased to 1,812,124 pounds in 1928 from the high figure of 5,567,278 pounds for 1925, one explanation being a shift to refined soy-bean oil to the extent of 2,731,640 pounds sent to that country last year, in contrast to very much smaller exports in previous years.

*Published by permission.

Exports of vegetable oils from the United States

Item and country of destination	1927 Quantity *Pounds*	1927 Value	1928 Quantity *Pounds*	1928 Value
Total exports	.....	$10,420,784	.....	$8,979,758
Cottonseed, crude, total	51,406,875	4,183,988	41,126,482	3,455,567
Canada	49,699,351	4,040,673	39,084,810	3,282,539
Mexico	1,480,555	126,373	2,036,159	172,561
Other countries	226,969	16,942	5,453	467
Cottonseed, refined, total	16,574,842	1,753,569	10,575,764	1,201,158
Denmark	129,970	12,335	.....	.....
Germany	319,281	29,369	39,958	4,064
Netherlands	223,096	19,425	6,009	700
Norway	1,724,100	161,157	76,567	8,218
Sweden	461,167	41,880	2,500	394
Canada	911,632	89,8·8	813,414	84,020
Panama	558,823	61,773	781,603	89,142
Mexico	1,717,507	175,494	3,456,740	347,499
Cuba	3,184,884	326,554	1,812,124	182,981
Argentina	2,176,717	226,441	777,491	90,420
Chile	905,802	98,220	484,201	59,562
Japan	833,778	113,515	882,301	135,452
Other countries	3,428,085	397,538	1,442,856	198,706
Corn oil, total	309,591	35,457	336,945	49,516
Canada	43,501	4,982	30,055	3,392
Cuba	4,090	532	3,373	473
Dominican Republic	39,870	4,619	5,735	784
British South Africa	2,175	303	5,375	685
Costa Rica	797	119	40,200	5,940
Guatemala	26,810	3,930	69,111	9,892
Other countries	192,348	20,972	183,096	28,449
Coconut, total	20,418,143	1,783,409	24,652,602	2,088,065
Canada	8,979,478	776,676	8,879,808	772,035
Nicaragua	214,286	19,957	219,884	30,374
Mexico	9,540,326	803,761	13,694,509	1,094,274
Cuba	718,124	70,846	817,654	83,276
Japan	118,177	17,077	164,342	25,212
New Zealand	175,260	23,375	150,259	18,589
Other countries	672,492	71,717	726,146	74,305
Linseed, total	2,525,240	303,737	1,965,147	227,886
United Kingdom	2,891	396	4,788	454
Canada	311,636	40,690	257,677	33,726
Panama	514,253	62,225	262,731	31,140
Mexico	175,111	23,381	164,096	20,691
Cuba	400,307	45,927	460,119	46,933
Colombia	216,217	29,096	147,556	19,408
Venezuela	118,082	12,372	29,022	3,608
Other countries	786,743	89,650	529,158	71,926
Soya bean, total	5,444,305	607,363	7,142,097	756,094
Canada	245,527	19,930	130,972	12,333
Cuba	2,432,249	246,617	2,731,640	266,271
British South Africa	748,237	96,290	567,425	65,320
Dominican Republic	908,298	92,724	1,638,045	166,263
Other countries	1,109,994	151,802	2,074,015	245,907
Vegetable soap stock, total	10,263,623	$548,754	7,528,590	$491,987
United Kingdom	5,342,199	220,020	3,390,138	154,919
Canada	2,779,738	191,703	2,250,137	190,210
Mexico	889,092	46,545	515,308	42,844
Cuba	464,630	38,944	687,890	56,057
Other countries	787,964	51,542	685,117	47,957
Other oils, n. e. s., total	8,482,049	1,204,497	8,190,180	709,385
United Kingdom	275,510	15,193	18,775	3,304
Canada	6,567,354	1,046,956	6,043,175	518,443
Mexico	548,836	36,048	1,673,968	138,025
Cuba	249,012	25,413	163,682	14,649
Other countries	841,337	80,887	290,580	34,964

Coconut oil.—Coconut oil (refined) ranks in second place among the vegetable oils and fats exports. These exports might be termed re-exports, however, inasmuch as the oil was either imported originally or came into the United States in the form of copra for crushing purposes. Exports reached 24,652,602 pounds in 1928—exceeding by a substantial margin the preceding year and much above those of any other recent year. During the last four years Mexico has retained first place as our best market, Canada running second, and Cuba a poor third.

Soya-bean oil.—Soya-bean oil refined in the United States from oil largely imported in the crude state has had a rapid increase in both volume and value as an export vegetable oil. Contrasted with but 2,264,195 pounds, valued at $252,571 in 1924, shipments last year rose to 7,142,097 pounds, valued at $756,094. Cuba and the Dominican Republic are the outlets.

Linseed oil.—There has been relatively little change in exportation of linseed oil since 1924. During the last five years Canada, Panama, Mexico, or Cuba have been the three best buyers, except in 1926 when, owing to temporary conditions, Great Britain took 669,135 pounds.

Vegetable soap stock, etc.—Exports of vegetable soap stock or fatty acids and other oils, for which no special provision is made in the export classification schedules, can be covered briefly by the statement that the fluctuations observed in the foregoing table may be regarded as attributable to changing conditions in the markets of the United States and abroad. The United Kingdom was the best buyer of American soap stock during each of the past five years, except in 1925 and again in 1928, when Canada led by a narrow margin over the United Kingdom. As the largest importer of the miscellaneous oils, Canada has retained first place regularly in recent years.

Imports of Vegetable Oils.

MOST important among the imported vegetable oils is coconut oil, which has constituted by value one-third of all vegetable-oil imports during the past five years. Our only source of supply since 1925 has been the Philippine Islands.

Imports of vegetable oils into the United States

Item and country of origin	1927 Quantity	1927 Value	1928 Quantity	1928 Value
	Pounds		*Pounds*	
Total imports	.....	$75,973,602	.....	$75,460,528
Olive oil, edible, total ..	75,025,218	17,576,880	82,943,820	14,951,146
France	6,009,714	1,393,447	4,543,399	904,745
Italy	47,110,081	11,244,800	53,936,151	9,945,803
Spain	18,894,511	4,296,386	22,692,760	3,797,555
Greece	1,015,868	193,967	477,164	81,038
Algeria and Tunis	1,556,787	359,486	683,761	109,145
Other countries	438,257	88,794	610,585	112,860

Imports of vegetable oils into the United States—Continued

Item and country of origin	1927 Quantity	1927 Value	1928 Quantity	1928 Value
	Pounds		*Pounds*	
Chinese wood oil, total ...	89,650,411	11,809,583	109,221,771	13,419,029
China	75,043,427	9,670,105	97,783,436	12,033,364
Japan	1,036,027	133,425	650,212	84,234
Hong Kong .	12,769,724	1,883,600	10,675,043	1,288,293
Other countries	801,233	122,453	113,080	13,138
Coconut oil, all Philippine Islands	293,369,704	22,899,807	290,636,702	23,061,357
Sesame oil, total	1,704,129	$203,413	6,238,878	$664,764
Germany	114,633	12,761	.....	.....
Belgium	200,404	25,138	257,707	30,366
Denmark	442,268	55,887	1,091,263	118,630
France	71,600	9,098	314,753	36,362
Netherlands .	631,507	68,101	4,455,007	461,434
Other countries	243,617	32,428	110,148	17,972
Peanut oil, total	2,847,424	339,905	4,748,818	519,522
France	825,574	99,314	553,102	63,651
Netherlands .	169,115	19,730	111,613	12,880
China	77,244	6,508	1,492,316	144,694
Hong Kong .	1,528,350	189,514	1,274,769	179,582
Other countries	247,141	24,839	1,317,018	118,715
	Gallons		*Gallons*	
Rapeseed oil, total	2,547,215	1,570,420	2,250,182	1,504,338
U. K.....	116,967	99,258	1,305,331	880,054
Japan	2,368,460	1,422,250	887,881	582,111
Other countries	61,788	48,912	56,970	42,163
	Pounds		*Pounds*	
Linseed oil, total	946,432	77,095	173,447	14,056
Germany	9,606	1,653	2,389	400
Netherlands .	814,012	65,205	123,487	9,341
U. K.....	32,728	3,026	12,809	1,106
Other countries	90,086	7,201	34,762	3,209
Soya-bean oil, total	14,914,792	887,747	13,116,220	823,619
Netherlands .	89,487	7,218	20,430	1,701
China	1,782,144	100,364	1,519,840	93,821
Japan	941,303	57,482	1,573,129	101,796
Kwantung ..	12,060,878	718,987	8,693,235	539,533
Other countries	40,980	3,596	1,309,586	86,768
Olive oil, sulphured or foots, total .	42,307,314	3,694,357	39,546,684	2,896,049
Greece	1,649,703	160,842	2,343,247	199,236
Italy	40,247,609	3,485,365	17,130,274	1,393,957
Portugal	.....	.....	3,204,868	70,854
Spain	92,157	9,737	15,234,690	1,083,082
Other countries	317,845	38,413	1,633,605	148,920
Olive oil, inedible, other total	6,818,949	1,115,103	8,723,823	1,175,447
Greece	2,405,320	380,577	919,6 9	118,224
Italy	1,653,250	195,905	319,391	36,797
Spain	2,070,769	402,709	5,203,555	713,713
Other countries	688,610	135,912	2,281,208	306,713
Palm oil, total	159,911,079	11,039,549	169,227,565	11,066,721
Germany ...	12,206,803	882,732	10,169,105	697,004
U. K.....	10,599,324	803,809	8,914,751	728,051
Netherland East Indies..	13,128,074	947,685	27,400,228	1,944,476
Belgian Congo	25,641,528	1,830,878	26,414,749	1,938,091
British West Africa	80,830,856	5,443,811	83,281,639	4,914,656
French Africa	9,599,099	587,484	7,391,242	438,725
Other countries	7,905,395	543,150	5,655,851	405,718
Palm kernel oil, total	43,115,337	3,547,283	53,812,482	4,369,100
Germany	13,255,749	1,069,376	27,286,411	2,209,929
Netherlands .	460,937	38,830	72,957	6,135
U. K.....	29,372,771	2,435,546	24,919,034	2,034,657
Other countries	25,880	3,431	1,534,080	118,379
All other, free, total	5,426,260	599,183	86,775	57,717
Netherlands .	.....	.....	.....	.....
China	44,000	5,196	.....	.....
Japan	905,560	82,069	.....	.....
Kwantung ...	4,408,600	460,214	.....	.....
Other countries	68,100	51,704	86,775	57,717
All other, dutiable, total ..	2,251,545	223,537	7,761,591	579,198
Netherlands .	339,487	34,754	235,634	21,484
U. K.....	1,227,057	102,893	1,849,103	164,244
China	189,890	20,673	1,324,000	94,391
Other countries	495,111	65,217	4,352,854	299,079
Vegetable tallow total	5,687,581	389,740	5,341,424	358,465
Argentina ...	220,881	14,500	.....	.....
China	5,408,781	366,651	5,314,087	353,154
Other countries	57,919	8,589	27,337	5,311

Edible olive oil.—Edible olive oil is second to coconut oil. Italy has had the largest part—approximately 66⅔ percent—of this trade in recent years, with Spain (from 13 to 24 per cent in different years) and France (from 6 to 8 per cent) in second and third place, respectively.

Chinese wood oil or tung oil.—Chinese wood oil or tung oil is second in importance. The United States is the largest consumer of this oil in the world and in 1928 its imports were decidedly larger than in any of the four years immediately preceding. China supplied approximately 90 per cent of our imports during each of the last five years, with the single exception of 1927, when the percentage dropped to 82. The free port of Hong Kong, by transshipment from China, sends practically all of the remaining imports.

Palm oil.—British West Africa and the Belgian Congo, the world's principal area of production for palm oil, supply the largest part of the imports of this oil. British West Africa is the principal source, but the two sections together have accounted for from 50 to 60 per cent of such imports during the past 5-year period. The Netherland East Indies are also important sources, but chiefly for the better grades of this oil, with its exports advancing markedly in value—indicative of steady development of palm-tree cultivation and expansion in oil extraction.

Palm-kernel oil.—The extraction of palm-kernel oil occupies a place of considerable importance in the growing crushing industries of the United Kingdom and certain of the countries of continental Europe, where the residual cake is utilized as a feeding stuff for livestock. Our principal imports of this oil come from the United Kingdom, Germany taking second place, although imports from both countries have tended to drop off somewhat in the last two years.

Inedible olive oil.—Importations of inedible olive oil employed in the manufacture of castile soap and for industrial purposes and olive oil foots going largely into soaps vary somewhat from year to year, depending to a considerable extent on crop conditions. Most of our inedible olive oil is imported from Spain, although in 1925, Greece, and in 1924, Italy, were the largest shippers.

Rapeseed oil.—Little change is reflected in our consumption of rapeseed oil over the past five years. Imports in 1925 were smaller than the average of the five-year period, and for 1926 they were greater. Here, again, the size of the crop and competitive world market conditions play a part in determining imports. United Kingdom and Japan supply most of this oil.

Peanut oil.—China supplies much of our peanut oil, though Hong Kong sends some and France a fair quantity. Imports in 1928 were larger than in 1927, but much below 1924 and 1926. Linseed oil achieved a place of distinctly minor importance last year, when imports were valued at only $14,056, which is in sharp contrast to 1925 when oil worth almost exactly one hundred times that amount came into the United States. Our foreign purchases are gauged by our domestic crop of seed and market levels abroad. Since 1926 the bulk of this oil has been supplied by the Netherlands. Prior to that year, the United Kingdom received much of our business. The Netherlands also furnished sesame oil, which did not receive separate classification until 1926. Imports have recorded a sharp drop since that year.

Soy-bean oil.—The only other oil not included in the miscellaneous groupings is soy-bean oil, of which substantial quantities have been imported during the past five years, the largest amount during 1926. Last year imports were reduced considerably. Imports originate chiefly in Manchuria via the port of Kwantung, but some oil is exported to the United States from both China and Japan.

Vegetable tallow.—China is the source, almost wholly, of vegetable tallow imports, which have undergone but slight changes as to size in the past five years.

Exports in the First Four Months, 1929.

EXPORTS of vegetable oils were valued at $2,397,000 for the first four months of 1929, compared with $4,373,487 for the same period in 1928 and $3,715,580 for the 1927 period.

Exports of vegetable oils from the United States, first four months

Item	1927 Quantity	1927 Value	1928 Quantity	1928 Value
	Pounds		*Pounds*	
Cottonseed oil:				
Crude	27,384,562	$2,268,547	7,030,294	$585,934
Refined	4,200,757	469,506	2,815,315	345,679
Corn oil	156,235	21,647	119,452	16,240
Other vegetable oils and fats, edible	1,197,713	179,747	971,139	163,228
Coconut oil	8,19.,964	704,315	6,723,860	577,610
Linseed oil	626,426	72,574	677,042	75.155
Soy-bean oil	2,429,552	264,964	2,586,189	258,768
Vegetable soap stock	2,664,082	162,974	2,645,832	185,088
Other inedible oils and fats.	2,805,739	229,213	2,232,030	190.070
Total		4,373,487		2,397,736

Crude cottonseed oil was responsible for a shrinkage to the extent of 20,354,268 pounds and $1,682,613 in value, as compared with last year, and exports were over 11,250,000 pounds and $800,650 short of the same period in 1927. Refined cottonseed oil suffered also.

An unsatisfactory price condition was apparently largely responsible for the fact that coconut oil exports were down about 1,500,000 pounds from those for the January-April period last year. Canada, our most important market, took uniformly close to 3,000,000 pounds for each four-month period, while Mexico increased its purchases last year some 1,500,000 pounds, taking from us this year in round figures 2,400,000 pounds. Cuba, ordinarily bringing in from 250,000 pounds to 300,000 pounds, this year received much more than double in similar periods in the past two years.

Exports of soya-bean oil showed some gain this year over 1928, but a more substantial increase was registered between 1927 and 1928, when they doubled in volume and nearly so in value. Consumer nations have not changed this year.

An oil in a comparatively minor rôle in the export group is linseed oil. Shipments from the United States appear to have been well distributed, especially in Latin America. Cuba imported more than any other one country. Exports during the first four months of this year and last were about the same, but noticeably lighter than in 1927.

Exports of corn oil in 1927 and this year were valued at slightly in excess of $16,000—approximately 100,000 pounds for each 4-month period. Last year shipments had a value of $21,000 for over 150,000 pounds. Several of the Latin American nations and Japan were the principal buyers.

Vegetable soap stock or fatty acids rank well up among the leaders in the exports. From January 1 to April 30 this year we sent abroad a little more than half of the exports for 1927—both as to weight and value. Conforming to buying habits of previous years, the United Kingdom and Canada were our largest customers.

The two miscellaneous classifications—"other expressed oils and fats" for oils of an inedible nature, and "other edible oils and fats"—include a very respectable percentage of the vegetable-oil exports. Changes from one 4-month period to another are sharply defined, but during the last three years Canada has been at all times easily the foremost consumer of these oils.

Record Imports in First Four Months, 1929.

RECORD imports of vegetable oils were registered during the first four months of this year.

Not at any time during the past five years, as determined by a pro-rata division of the yearly imports in 1924 and 1925 and the actual figures for the past three years, have our imports even offered a semblance of an approach to the record established during January to April of the current year. This year, for the period named, vegetable oils of foreign origin coming into the United States had a declared value of $31,451,655, against $23,272,806 last year for the same four months, and $22,750,471 in 1927. Favorable prices and fear of the imposition of higher rates of duties account for much of this importation.

Imports of vegetable oils into the United States, first four months

Item	1928 Quantity	1928 Value	1929 Quantity	1929 Value
	Pounds		*Pounds*	
Palm kernel oil	8,580,167	$708,902	25,304,415	$1,995,473
Sesame oil	1,703,425	186,816	7,074,740	654,465
Vegetable tallow	3,189,893	219,082	3,945,593	291,841
Olive oil, edible	28,744,409	5,129,174	30,268,380	5,470,221
Peanut oil	3,278,422	325,494	1,925,911	186,496
Linseed oil	113,544	8,611	6,531,672	406,452
Soy-bean oil	5,371,119	330,950	6,101,238	387,331
Chinese wood oil	28,400,735	3,551,370	33,480,577	4,208,380
Coconut oil	99,022,666	7,768,685	131,588,704	9,895,903
Olive oil, inedible:				
Sulphured	10,394,825	840,097	18,898,057	1,346,653
Other	4,020,297	527,926	4,142,753	564,608
Palm oil	44,684,503	2,966,494	82,957,679	5,631,016
Other expressed oils	2,151,135	196,989	7,540,190	532,964
	Gallons		*Gallons*	
Rape oil	750,760	522,206	638,287	412,811
Total	.....	23,282,796	.....	31,984,619

Source: Monthly Summary of Foreign Commerce and Navigation of the United States.

Coconut-oil imports rose from, roughly, 99,000,000 pounds in both 1927 and 1928, when the average price, according to declared values, was $0.08 and $0.078 per pound, to 131,500,000 pounds valued at $0.07½ per pound, or a little less than $9,900,000 during January to April this year. This is a gain of over one-third in volume.

However, a further proof that prices may be a powerful stimulus or a serious deterrent is found in the imports of edible olive oil, which were 500,000 pounds in excess of the January-April period of 1927, but $1,000,000 less in value.

There were no shifts as regards sources of supply, which applies likewise to sulphur olive oil or foots and the inedible or industrial grade. The two last-mentioned classifications reflect substantial gains during the first four months of the current year over 1928. The price factor is again emphasized on these oils—particularly the sulphur quality—the increase of our January-April receipts this year over 1927 being 3,600,000 pounds, with relatively little difference in comparative values.

Imports of palm oil were practically double those last year, and nearly treble the importations of this oil in tonnage, though not in money totals, in the first four months of 1927. As usual, British West Africa was the chief supplier.

An increase of 5,000,000 pounds and $700,000 in value was recorded in the case of Chinese

wood oil this year as compared with the 1928 and 1927 periods.

Palm-kernel oil.—The average price per pound of palm-kernel oil imported up to April 30 of this year was one-fourth of a cent less than in 1928, and nearly 1 cent below 1927 for corresponding periods. The volume jumped to thrice our imports last year and was twelvefold the arrivals in 1927. This is the biggest gain registered in the entire vegetable oil category, and this year is also noteworthy in that Germany replaced the United Kingdom as the principal exporter to the United States.

Sesame oil.—There was a remarkable gain in sesame oil as well. Between January 1 and April 30, 1927, our imports classed this oil as among the comparatively unimportant oils. The following year, for the same period, we had more than doubled the importation, while prior to April 30, this year, there was entered officially in excess of nine times the quantity coming in during 1927. We continue to buy much of this oil from the Netherlands.

Other oils.—Other vegetable oils or fats to show a gain from January to April, inclusive, this year, are vegetable tallow and linseed oil—notably the latter—our normal importation of which is inconsequential. In April of this year, Germany alone shipped us 6,313,872 pounds, with a declared value of $391,348. There were 217,800 pounds, worth $15,104, from other sources during the first three months of 1929. Imports for the first four months of 1928 and 1927 fell decidedly below those of 1929. Vegetable tallow gained somewhat over 1928, the arrivals being a substantial increase as to tonnage over 1927 and 1928.

Soya bean oil receipts from Manchuria between January 1 and April 30 were more than eight times as large as 1927, and heavier than last year.

Rapeseed and peanut oils were the only two oils in the entire list to show losses, the former declining in the period between January 1 and April 30 by over 100,000 gallons, while peanut oil was down nearly 50 per cent from last year's receipts.

Castor Oil Effects in Soaps

It is claimed that the shortage of soapmaking fats in Russia has fostered the adoption of certain fats for this purpose which are not generally so used in other countries. A recent report notices the substitution of castor oil for cottonseed oil, and claims the production of a much better soap thereby. Soap from stock containing up to fifteen per cent of castor oil is said to be firm and to lather well, although about fifteen per cent the lathering power is diminished.

In commenting on this report, "*The Perfumery and Essential Oil Record*" says: "The use of castor oil in this country as a general soapmaking material is precluded by its high price compared with other material which is readily available, and any considerable proportion of castor oil has a distinct effect on the odor of the soap which might be objectionable. Its most important uses in soap, however, are in the cold process transparent soaps, for which about one-third of the fatty matter is a usual proportion, and in the manufacture of liquid soaps or soap solutions, for which castor oil is especially suitable on account of the much greater solubility in water of castor oil soap over any other. Another extensive use of castor oil by the soap industry during the war was for the manufacture of soda soft soaps in place of potash soft soaps, because of the scarcity of potash. To make a soft soda soap, material of a low titer is essential. Castor oil, with a titer of 3°C. is therefore about the best material available for this particular purpose."

A Reminder

THE coming of Summer with its attendant vacations (and heat!) has a natural tendency to slow up work of a special nature. Let me therefore remind the laboratories now cooperating on the standardization of the Soap Section's Standard samples of crude glycerine and soap that there are a number of collaborators still to report their results. Inasmuch as we hope to have accepted standards for these two samples ready for publication at the next meeting of the A.O.C.S. in October, it is desirable to have all the results in the hands of the committee as soon as possible, so that adequate consideration may be given them and a method of deriving a final analysis worked out.

I should like to ask therefore that those who have not yet reported kindly bear this in mind and forward their analysis to the Secretary as soon as convenient. Anyone interested in this work who would like to cooperate is cordially invited to join us. It is not too late. Further information may be had from the Chairman, A. K. Church, care Lever Bros., Cambridge, Mass., or the Secretary, W. A. Peterson, care Kirkman & Son, 215 Water Street, Brooklyn, N. Y.

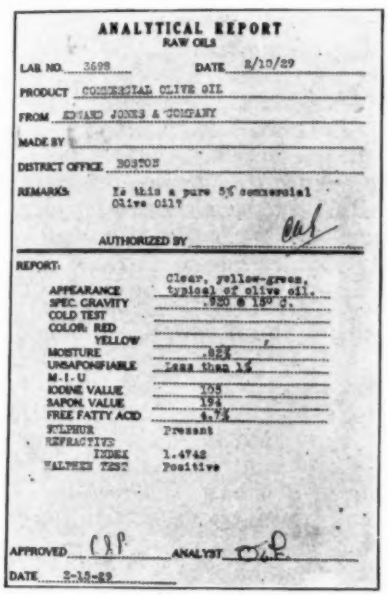
W. A. Peterson
Secretary of Soap Section A.O.C.S.

Analysis Interpretation For The Layman

What the Various Terms Used in Fatty Oil and Sulfonated Oil Analysis Mean

By C. I. Post
Chief Chemist, National Oil Products Co.

IN COMPILING this brief collection of terms which appear most frequently in oil analysis, an attempt has been made to explain as clearly as possible the meaning of these terms to those who have had little or no chemical training. The definitions are well cross-referenced so that a strange term appearing in any definition may be found defined in another place. In order better to illustrate the use of these definitions and also that they may serve as a glossary rather than a dictionary, the following two analyses of a raw oil and a sulfonated oil are included.



ANALYTICAL REPORT
RAW OILS

LAB NO. 3698 DATE 2/10/29
PRODUCT COMMERCIAL OLIVE OIL
FROM EDWARD JONES & COMPANY
MADE BY
DISTRICT OFFICE BOSTON
REMARKS: Is this a pure 5% commercial Olive Oil?
AUTHORIZED BY

REPORT:

APPEARANCE	Clear, yellow-green, typical of olive oil.
SPEC. GRAVITY	.920 @ 15° C.
COLD TEST	
COLOR: RED	
YELLOW	
MOISTURE	.02%
UNSAPONIFIABLE	Less than 1%
M.I.U.	
IODINE VALUE	105
SAPON. VALUE	191
FREE FATTY ACID	4.7%
SULPHUR	Present
REFRACTIVE INDEX	1.4742
HALPHEN TEST	Positive

APPROVED CAP ANALYST C.I.P.
DATE 2-15-29

REMARKS

This sample has the typical olive oil color and an oil of rosemary odor indicating its use as a denaturant.

The specific gravity, however, is too high for olive oil and suggests immediately the presence of cottonseed oil as do also the high iodine value and refractive index. Rapeseed oil is excluded by the saponification value which is much too high for that oil, but all right for both cottonseed and olive.

The presence of cottonseed oil was confirmed by an extremely positive specific color reaction, the Halphen test.

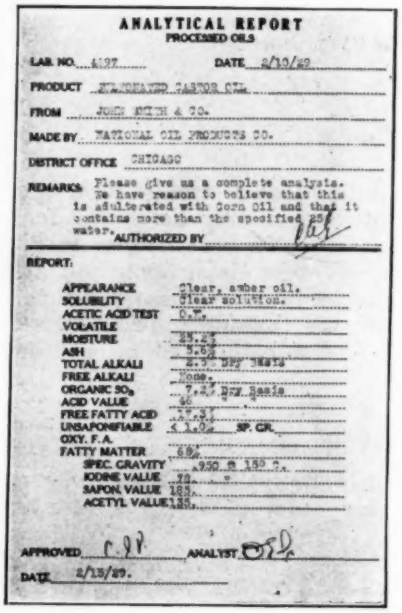
A positive sulfur test indicates the presence of an extracted oil and the color and free fatty acid practically limit the possibilities to olive oil foots.

We report this sample as being over 90% cottonseed oil and the remainder 5 to 8% olive oil foots.

They are shown on the regular report forms; the analysis itself, with necessary relevant information as to the source of the sample, appears on the face of the report, all explanations leading to an interpretation of the analysis appearing on the reverse side.

The amount of adulterants present in the raw oil sample is purposely exaggerated in order better to illustrate the points which are brought out. It should not, therefore, be regarded as a typical olive oil sample or one ordinarily met in the course of an oil chemist's experience. The sulfonated oil sample, on the other hand, is a pure sulfonated castor oil and its full analysis is given as a model of the proper analytical figures for the most common sulfonated oil on the market.

1. **Acetyl Value**—The acetyl value is a measure of the presence of oxy or hydroxy acids in an oil. The higher the acetyl value, the greater the number of these acids. Practically, without exception, the fatty oils have acetyl values of 20 or under. The one great exception is Castor Oil, having an acetyl value of 155. This determination has



ANALYTICAL REPORT
PROCESSED OILS

LAB. NO. 4197 DATE 2/10/29
PRODUCT SULPHONATED CASTOR OIL
FROM JOHN SMITH & CO.
MADE BY NATIONAL OIL PRODUCTS CO.
DISTRICT OFFICE CHICAGO
REMARKS: Please give us a complete analysis. We have reason to believe that this is adulterated with Corn Oil and that it contains more than the specified 25% water. AUTHORIZED BY

REPORT:

APPEARANCE	Clear, amber oil.
SOLUBILITY	Clear solution.
ACETIC ACID TEST	Clear
VOLATILE	
MOISTURE	25.2%
ASH	3.6%
TOTAL ALKALI	2.95 Dry Basis
FREE ALKALI	None.
ORGANIC SO_3	7.47 Dry Basis
ACID VALUE	96
FREE FATTY ACID	48.2%
UNSAPONIFIABLE	< 1.0% SP. GR.
OXY. F.A.	
FATTY MATTER	69%
SPEC. GRAVITY	.950 @ 150° C.
IODINE VALUE	78
SAPON. VALUE	183
ACETYL VALUE	135

APPROVED C.P. ANALYST
DATE 2/13/29.

REMARKS

This is a pure sulfonated castor oil. The light color indicates the use of #1 castor oil as the raw material rather than #2 or #3 and suggests strongly the absence of corn oil. The moisture content of 25.2% is entirely within specifications for 75% oil.

The low total alkali and acid value together with the high organic SO_3 indicate an oil of high sulfonation and low subsequent decomposition, and enable us to predict that it will be stable in acetic acid solution. This has been verified by the acetic test.

The low unsaponifiable precludes the presence of mineral oil.

The high acetyl value of the separated fatty matter definitely indicates the absence of corn oil. Pure castor fatty acids have an acetyl value of about 150 which has been lowered slightly in the sulfonation process to 135.

The iodine value of the fatty matter is 78, as compared to 90 for castor fatty acids. This slight lowering is typical of sulfonated castor oil. All other oils show a large drop in I. V. when sulfonated, due to the different type of reaction occurring between sulfuric acid and the fat. This is caused by the absence of hydroxy groups in all common oils except castor.

great value in the detection of the presence of Castor Oil in sulfonated Olive Oil.

2. Acid—Broadly speaking, an acid is a compound which contains one or more atoms of hydrogen and which gives free hydrogen ions in solution. Acids turn litmus red and phenolphthalein colorless. Some common examples are: Hydrochloric acid—HCl, Sulphuric acid—H_2SO_4, Acetic acid—$HC_2H_3O_2$, Stearic Acid—$HC_{18}H_{35}O_2$, Oleic Acid—$HC_{18}H_{33}O_2$, Linoleic acid—$HC_{18}H_{31}O_2$.

3. Acid, Fatty—The fatty acids are a type of organic acid. That is, they contain nothing but carbon, hydrogen and oxygen in the molecule as distinguished from the inorganic acids which may contain chlorine, sulphur, phosphorous, etc. A good general way to distinguish fatty acids from other organic acids is that they usually contain hydrogen atoms greatly in excess of carbon atoms. (See Stearic, Oleic and Linoleic Acids, under Acid.)

4. Acid, Combined Fatty—In a sulfonated oil, part of the fatty acids may be still combined in the form of a soap or glyceride. This portion is termed "Combined Fatty Acid" and is given in percent.

5. Acid, Free Fatty—That part of the fatty acids in an oil which is free and exists as such is termed "Free Fatty Acid." Since the nature of the fatty acids in various oils varies greatly, it has been necessary to adopt a standard by which to report the free fatty acid content of an oil. Oleic Acid is the one which has been adopted, since it is of such general occurrence in most of the fatty oils.

6. Acid, Total Fatty—The sum of "Combined" and "Free" fatty acid in an oil is the "Total" fatty acid.

7. Acid, Oxidized Fatty—The fatty acids normally contain two atoms of oxygen to the molecule. (See Stearic, Oleic, and Linoleic Acids under Acid.) When oxidized, either by blowing or by exposure to air, these acids take up one or more atoms of oxygen to form new compounds. Cod Liver Oil when oxidized forms the well known Moellon Degras.

8. Acid, Mineral—These are inorganic acids which do not necessarily contain carbon and oxygen and which are not of organic origin. Hydrochloric acid—HCl, Sulphuric acid—H_2SO_4—Nitric acid—HNO_3 are the best known examples.

9. **Acid Value**—The acid value of an oil is a measure of the free acid present. The higher the acid value the greater the acidity. The acidity of an oil is usually reported in terms of acid value, but it may very readily be converted into percent free fatty acids by dividing by 2. This will give a very close approximation to the free fatty acid content, in terms of oleic acid. (See Acid, Free Fatty.)

10. **Acidity**—This is simply a relative term used to express the acid strength of an oil or solution. The presence of a good deal of acid means a high acidity. A small amount of acid means a low acidity.

11. **Alcohol**—An alcohol is to organic chemistry what an alkali is to inorganic. They both have the distinguishing hydroxyl radical. An alkali reacts with an acid to form a salt and water, while an alcohol reacts with an acid to form an ester and water:

Sodium hydroxide	+	Hydrochloric acid	=	a Salt + Water.
NaOH	+	HCl	=	NaCl + H_2O.
Ethyl Alcohol	+	Acetic Acid	=	an Ester + Water.
C_2H_5OH	+	$HC_2H_3O_2$	=	$C_2H_5C_2H_3O_2$ + H_2O.

The most common examples are methyl (wood) alcohol—CH_3OH, ethyl (grain) alcohol—C_2H_5OH, glycerol (glycerine) $C_3H_5(OH)_3$, cholesterol—$C_{26}H_{43}OH$.

12. **Alkali**—An alkali is an inorganic compound containing one or more OH (hydroxyl) radicals and giving free hydroxyl ions in solution. It is invariably a compound made up of some metal and the hydroxyl radical. Alkalis turn litmus blue and phenolphthalein red. Common examples are sodium hydroxide (caustic soda) —NaOH, potassium hydroxide (Caustic Potash) KOH, calcium hydroxide (slaked lime) —Ca $(OH)_2$.

13. **Alkali, Combined** — The percent of alkali (e.g. sodium hydroxide) present, combined with fatty acids in the form of soap (e.g. sodium stearate). In an analysis, Combined Alkali is always reported in terms of percent of potassium hydroxide, although the alkali used may be sodium hydroxide, ammonium hydroxide, or any other. This is simply for the sake of uniformity.

14. **Alkali, Free**—The percent of alkali present in excess of fatty acids, and fat, and which, therefore, exists in free form. Free Alkali, also, is always reported in terms of percent of potassium hydroxide, although the actual alkali present may be of a different nature.

15. **Ammonia**—Ammonia is a gas composed of three atoms of hydrogen chemically combined with one atom of nitrogen and having the formula NH_3. Ammonia dissolves in and combines with water in the following way to give ammonium hydroxide, or ammonia water, NH_4OH

$$NH_3 + H_2O = NH_4OH$$

This is therefore an alkali, since it contains the hydroxyl radical, and the NH_4 or ammonium radical acts in a good many ways exactly like a metal. Ammonium hydroxide reacts with fatty acids to give soaps just as sodium or potassium hydroxide would. When the term ammonia is used in the oil, soap and fat industries, it almost invariably refers to a water solution of the compound, which, to be strictly correct, should always be referred to as either ammonium hydroxide, ammonia water, or aqua ammonia. In the ice plant and refrigerant industries, where the anhydrous ammonia principally is used, the term ammonia is used in its correct sense, and refers to the compound NH_3 instead of NH_4OH which is used in the soap industry.

16. **Ash**—The ash, in any analysis of oils, is that portion of the oil which remains when the sample has been subjected to a red heat for some time. The organic portion burns off leaving a residue, or ash, of inorganic salts, such as sodium chloride or sodium sulphate.

17. **Baumé**—This is the name given to two scales for expressing in simple numbers the specific gravity of liquids both heavier than and lighter than water. In the former class, belong solutions of mineral acids, salts, alkalis, etc. Taking water as a standard, having a specific gravity of 1.0000 and a Baumé reading of zero degrees (0°), the scale goes up to a specific gravity of 2.0714 or a Baumé of 75°. In the lighter than water class are the vegetable and mineral oils. Starting with water again, it is given a Baumé of 10° and the scale goes down to a specific gravity of .5833 or a Baumé of 110°. Thus we see that with liquids lighter than water, the lighter the liquid the greater its Baumé reading. Different instruments must be used in the two classes of liquids.

18. **Carbonate**—A carbonate is a salt and is the result of the combination of any alkali with carbonic acid. Our most common example is sodium carbonate or soda ash—Na_2CO_3.

19. **Caustic**—Any strong alkali, (e.g. sodium or potassium hydroxide). These two compounds are generally referred to as Caustic Soda and Caustic Potash, respectively.

20. **Chloride**—A chloride is a salt and is formed by the action of any alkali with

(*Turn to page* 36)

A New and Novel Use for Glycerine

GLYCERINE is being effectively employed as a drying agent for illuminating gas at the Colwyn Bay, Wales, gas works.

It is agreed that the ideal drying medium for coal gas is a liquid process which shall be continuous and reasonably automatic. The liquid must be chemically stable, hygroscopic, and it must also be susceptible of reconcentration without loss. In addition the liquid must be reasonable in cost and must be free from all possibility of solidification.

The glycerin experimented with for this purpose, and which has now been installed at the Colwyn Bay gas works, is found to possess the necessary qualities in a remarkable degree. It is extremely hygroscopic, and on exposure to the atmosphere will take up no less than 50 per cent of its weight of water. The boiling-point of the glycerin-water mixture in the reconcentration varies between 80 and 95 degrees C., working at a maximum pressure of 9 inches, which is entirely suitable for the heating of the evaporator by means of the exhaust steam gases from the washer engine. The glycerin gas-drying plant has now been in operation at the Colwyn Bay gas works for three or four months, and is the first plant of its type. It was erected after considerable investigation had been carried out on a laboratory and a commercial scale. The results of these initial experiments prove conclusively the advantages and efficiency of extraction which can be obtained by the use of glycerin as a drying agent, and the results obtained at Colwyn Bay can be claimed to have completely established glycerin as the means of obtaining dry gas.

In this case the plant is located at the outlet of the gasholder and consists of the latest "Standard" square-type rotary washer, fitted with corrugated bundles, and has a capacity of 2,000,000 cubic feet a day. The washer has four bays, is fitted with external overflows, and the glycerin in these bays varies in concentration from 1.2750 to 1.235 specific gravity. The diluted glycerin rapidly overflows from the last bay of the machine to a weak liquor storage tank situated below the ground level. The plant is completed by the automatic evaporator and the necessary two small pumps required by the latter part of the plant.

The weak liquor in the lower tank passes through an automatic feeder into the calandria of the evaporator, when the latter is put into operation, and here the water which is taken up from the gas is evaporated off under a vacuum of 15 inches, supplied by a small air pump driven from the washer countershaft. The necessary heat is supplied by steam at approximately 40 pounds pressure, and is applied to the outer surface of the tubes in the calandria. The water evaporated off is condensed by a jet condenser. The water required for this purpose is supplied from the gasholder, to which it returns, and also in its course passes through a small tubular cooler which is fitted to the side of the washer and cools the concentrated glycerin, which is pumped from the evaporator by a small rotary pump to the concentrated glycerin tank situated on top of the washer. The power required for the air pump and the small rotary pump is only one-half horse-power. The concentrated glycerin tank is fitted with a gauge glass, and the final bay of the washer is equipped with a special hydrometer vessel, so that the addition of glycerin and the maintenance of the glycerin concentration in the washer are under complete control. It is only found necessary to use the evaporator for a few hours every three or four days, and once put into operation, it requires no further attention.

Below are given the results obtained on the plant after it had been in operation a few weeks. It will be noted that the concentration of the glycerin in the dryer is low—namely, 1.2750 (82.7 per cent=s.g. 1,305)—and this necessarily reflects on the percentage reduction in the humidity. It would appear, however, that generally a reduction of 60 per cent in the humidity gives a sufficient lowering of the dewpoint to prevent condensation, and is therefore quite satisfactory for normal working.

The following are the test results at Colwyn Bay:—

Quantity of gas passed per day, 700,000 cubic feet.

Average temperature of gas, 62.5°F.

Concentration of glycerin:—

	S. g. at 50° F.	Glycerin per cent
No. 1 bay	1.2750	75
No. 2 bay	1.2625	72
No. 3 bay	1.235	64
No. 4 bay	1.235	64

Saturation of gas (outlet of dryer), 40.5° humidity.

Reduction of dewpoint of gas, 62.5° to 37°F.

ABSTRACTS

David Wesson, *Abstract Editor*

Pure glycerol containing 0.005 percent ash and 0.008 percent sulfuric acid was heated in a glass flask at 120-125° in the presence of various metals. Aluminum and copper have the smallest, and iron and lead the greatest effect on the quality. The glycerol was greatly improved by filtration through paper and charcoal. *Masloboino Zhirov. Delo* 1928, No. 4, 13-4

The percentage of neutral oil in a sulfonated oil can be determined by the saponification number of the sulfonated oil provided the saponification number of the original oil is known. An alcoholic solution of the sulfonated oil must first be neutralized to phenolphthalein. Satisfactory agreement has been secured through this method with the usual separation method for neutral oil. *J. Am. Leather Chem. Assoc.* 24, 120-1 (1929)

Fats of high vitamin-A content are said to be capable of extraction from viscera and like material by freezing and pulverizing the material, thawing and treating with caustic soda or other suitable alkaline solution, heating to about 40°, mixing, allowing to stand; then separating the fat after the protein has dissolved. Brit. Pat. No. 293,777.

Sulfonation of castor oil or other fatty materials or derivatives may be effected by the use of sulfuric acid together with a dehydrating agent such as oxides, chlorides, oxychloride or acids of phosphorous. Chlorosulfonic acid also may be used and the reaction products may be rendered less viscous by the use of acetic acid or acetic anhydride. Brit. Pat. No. 293,690.

Because cold-made coconut oil soaps are said to contain about fifteen percent of unsaponified oil, it is claimed that this might explain the tendency toward rancidity that they possess. This unsaponified portion consists of 83% diglyceride and 17% monoglyceride of lauric and oleic acids. The free fatty acids present in the unsaponified oil consist of a low molecular mixture of capronic and caprylic acids. The unsaponified glycerides do not contain these acids, which have a peculiar odor and the faculty of rapid oxidation. *Am. Perfumer* 23,772-4; 24,61-2 (1929)

The emulsion forming capacity of fats may be measured by means of a "capillary electrode," as follows: two copper plates are kept apart by two pieces of glass of about 0.2 mm. thickness within a rubber band around the whole. The breaking of an emulsion is indicated by the glowing of an electric lamp of 50 candlepower with alternating current of 120 volts and 50 cycles passing through these electrodes and through the emulsion at 40-45°C. The emulsion forming capacities of various fats may be thus shown by different stabilities of emulsions.

A new saponifier and emulsifier for fats is prepared by sulfonation of the thick black vaseline-like residue of non-decomposed fats remaining after the distillation of stearic acid. It is said that this saponifier produces fatty acids somewhat darker than those obtained in the Twitchell process, but that the glycerine is lighter. *J. Chem Ind.* (Moscow) 5. 1176-81 (1928)

The Iodine value (Hanus) of tung oil has been found to rise markedly with increasing time of reaction from ¼ hour to 2 hours, and afterwards to remain steady at 230-240, corresponding to saturation of the three double linkages of the oleostearic acid present. Since with other vegetable oils a constant Iodine value is obtained after ¼ hour it has been suggested that the presence of tung oil in linseed oil might be recognized quantitatively by observation of an Iodine value increasing with the time of reaction. *Farben-Ztg.* 33.-2480-4 (1928)

Wood oil in carbon disulfide solution has been polymerized at room temperature by standing overnight with one percent of a 5 percent solution of anhydrous stannic chloride in carbon disulfide. A yield of 56 percent of an acetone-insoluble gel was obtained. The method is said to be applicable to linseed oil and to cod liver oil. *Chem. Umschau Fette, Oele, Wachse Harze* 36, 58-9 (1929)

Notes of the Industry

Ask Higher Duty on Fatty Acids

Fred F. Jordan, of National Association of Stearic Acid Manufacturers, appeared before the Senate Finance Committee recently to request higher duties on stearic acid and stearine. The present duties are 1½ cents pound on stearic acid and 25 per cent on stearine. The new house bill provides for dutying both at 25 per cent. Mr. Jordan stated that large amounts of foreign material had been shipped into the country recently, and asked for an increase of rate to 50 per cent on both stearic acid and stearine. He also requested an increase in the duty on glycerine from 1 cent pound on crude and 2 cents on refined, the present rates, to 4 cents pound on crude and 6 cents on refined.

Continental Can Co. has recently acquired the assets and business of Eastern Shore Can Co., Hurlock, Md., and of Federal Can Co., Nashville, Tenn. The purchase of the latter plant opens up new territory not served by Continental Can Co. previously. W. D. Trabue, formerly with Federal Can Co., will join the Continental organization. About $5,000,000 will be spent by Continental during 1929 on plant construction, improvement of its facilities and purchases, of which amount $3,000,000 has already been spent. New plants are now under construction at Chicago, Oakland and Los Angeles, and construction work is also progressing at several other branch plants.

The oil of the avacado may soon be available commercially as a result of experiments by U. S. Bureau of Chemistry and Soils. Large amounts of cull fruit, not up to market standards, are available each year. Previous attempts at pressing have resulted in an emulsion of the oil with the watery juice of the fruit, which was not found satisfactory. The new process will involve dehydration of the sliced avacados at ordinary temperatures before pressing. The oil has a dark green color by transmitted light and is red by reflected light. It has a fruity odor, and will not become rancid easily, making it suitable for the soap kettle.

A. & E.-Niger Office Changes

Robert S. Hebert, manager of African & Eastern Trading Co.'s vegetable oil department, has moved his office to the headquarters of the Niger Co., 82 Beaver St., New York, to facilitate the carrying on of business until the actual combination of the two companies in this country. H. W. King, in charge of cocoa for Niger, has moved his headquarters to the African & Eastern offices at 10 Bridge St., New York. The parent companies in England have already been joined as United Africa Co., Ltd. Plans are on foot to effect the same merger in this country, the name of the combined companies to be United Africa Co., Inc.

Sir Robert Whaley Cohen, chairman of the board of United Africa Co., Ltd., arrived in the United States July 3 for a short stay. H. J. McFall, manager of the firm's cocoa department, has been here since late in June. Both men were formerly connected with African & Eastern Trading Co., Ltd.

To Use Planes in Whale Hunt

The American demand for increasing quantities of whale oil is being met by improvements in the ancient art of whaling. The whaler, C. A. Larsen, which takes whales in at the bow of the ship and which is equipped with complete machinery for whale oil production, is to be improved on by the Norwegian whaler, Norwega, which will use airplanes during the next season. Capt. Finn Luetzow Holm, noted arctic aviator, who left this country for Norway late last month, took a plane along to use in the East Antarctic. He expects that he will be able to quickly survey a large section of water and count the number of whales in any school.

Spencer Kellogg & Sons, Buffalo, will center their production of coconut oil in Kansas City. The old Palmolive brand, recently taken over by Spencer Kellogg, will be continued, and a new brand, Kellogg's edible coconut oil, will be manufactured.

Competition for the Norwegian whale oil enterprises in the Antarctic field is forecasted in the news that financial interests in New South Wales are attempting to form a new company with capital of £750,000.

Analysis Interpretation

(*From page 27*)

hydrochloric acid according to the following reaction: $NaOH + HCl = NaCl + H_2O$. The salt formed in this case is sodium chloride or "common salt."

21. Cholesterol — This is an alcohol which is present in all animal oils and the presence of it enables us to distinguish animal from vegetable oils. The latter contains a similar alcohol called phytosterol.

22. Cloud Test—The cloud test is run on oils for the purpose of discovering the presence of any impurities which may settle or separate out at lower temperature. The oil is chilled and the temperature taken at which it becomes cloudy. For some purposes an oil which becomes cloudy at too high a temperature cannot be used.

23. Cold Test—The cold test of an oil is the temperature at which the oil will just flow. It is of importance that this point be known fairly accurately in certain oils, e.g. Neatsfoot oil.

24. Degras—Degras is a common name for wool grease. It is a greasy exudation from the skin of sheep and is obtained by the washing of wool.

25. Degras, Moellon—This is not to be confused with ordinary degras. It is an oil obtained as a by-product in the process of currying leather and is formed by the oxidation of the fish oil in the leather. It is a mixture of unchanged fish oil, free fatty acids, and oxidized oil.

26. Degras Former—This is a resinous substance in Moellon Degras and consists principally of oxidized oil. The amount of it can be used as a measure of the extent to which the Moellon contains oxidized acids.

27. Emulsify—We emulsify two liquids when we so treat them as to form an emulsion. An emulsion is a suspension of very fine droplets of one liquid in another liquid. These droplets may be so small as to not be seen through an ordinary microscope. Emulsions are usually milky in appearance. Milk itself is a true emulsion of butter fat in water. Most sulfonated oils when added to water form a milky emulsion of oil in water.

28. Extraction — Extraction is the removal of a liquid from a solid by means of dissolving it in another liquid. No. 3 castor oil is made by treating the beans (from which No. 1 oil has been crushed) with some solvent such as carbon disulfide or petroleum naphtha. This solvent dissolves and extracts the oil from the bean pulp.

29. Fire Test—This is the lowest temperature at which an oil will give off vapors which when ignited will burn continuously. This is an important test in certain classes of mineral oils.

30. Flash Test—This test is used to determine the flash point of an oil. The flash point is the lowest temperature to which an oil must be heated to give off vapors which, when mixed with air, produce an explosive mixture.

31. Glyceride—A glyceride is an ester (see Alcohol) formed by the action of a fatty acid on glycerol or glycerine. Our most common glycerides are those of palmitic, stearic and oleic acids and are called respectively: palmitin, stearin, and olein. Glycerides constitute by far, the major portion of all fatty oils.

32. Glycerine—Glycerine or glycerol is an alcohol which is found in the majority of fats and oils in combination with fatty acids as glycerides. If these glycerides are treated with an alkali, a soap is formed and free glycerine is liberated.

33. Gravimetric—If, in analyzing a substance chemically, the amount of any constituent is determined by weighing, then the analysis is called gravimetric.

34. Gravity—Gravity is the force of attraction between any two bodies in space. We are principally interested in the force or pull exerted by the earth upon bodies on the earth. This pull is determined by weighing.

35. Gravity, Specific—Specific gravity is the measure of the pull of the earth on a unit volume of a substance, or the weight of a unit volume of a substance, when referred to pure water as a standard of 1.0000. Substances having a specific gravity of less than 1 are lighter than water. Those having a specific gravity of more than 1 are heavier than water. All fatty and mineral oils have specific gravity of less than 1 and are therefore lighter than water, and will float on it. Due to the expansion and contraction of oils with change in temperature, the temperature at which the specific gravity is taken must always be included in a report. For instance, the specific gravity of Palm Oil is .9236 at 15° C.

36. Hydrogenation — This is the term used for the treatment of certain oils with hydrogen gas at high temperatures in the presence of small amounts of foreign substances known as catalysts. The hydrogen combines with the oil to form solid fats having a much higher titre (See Titre) and

much lower Iodine Value (See Iodine Value). Cottonseed oil, for example, may be hydrogenated to a solid fat of a waxy hardness. The hydrogenation process is of great importance in making lard substitute and in the soap industry.

37. **Inorganic**—This is used to describe those compounds which are of mineral, rather than organic origin.

38. **Iodine Value**—This is a measure of the drying powers of a fatty oil. The drying of an oil is due to its taking up of oxygen from the air. In the same way, it will take up Iodine, and the amount of Iodine absorbed is an accurate index of its drying power. All oils have their own specific iodine values and the determination of the value is of great aid in identifying oils. The non-drying oils have low iodine values, e.g. palm oil 53, cocoanut oil 10, tallow 56. The semi-drying oils have slightly higher values e.g. cottonseed oil 108, corn oil 115. The drying oils are still higher e.g. Linseed Oil 176, Soya Bean Oil 140, Cod Oil 160.

39. **Linoleate**—A linoleate is a combination of any metal with linoleic acid, and is therefore a soap. (See Soap.) If the metal used is one of the alkalis (Sodium, postassium, or ammonium) the soap is soluble in water, and is suitable as a detergent or for being used for its cleaning power. If, however, the metal is any other than one of the alkalis, the resulting soap is insoluble in water and belongs to the class of materials that are commonly called "metallic soaps."

40. **Moisture**—In the analysis of sulfonated oils the moisture content is of extreme importance since oils are bought and sold largely on this factor alone. A "50% oil" should contain 50% moisture, a "40% oil" should contain 60% moisture, a "75% oil" should contain 25% moisture. A variation of over 2% from the claimed moisture content is too great to be allowed. This important test has been performed in various ways all of which give different results. The standard method is that of the American Leather Chemists' Ass'n. It is as follows and should absolutely be insisted upon in sulfonated oil analysis for purposes of comparison: "Weigh into a small beaker containing 5 to 10 grams of dried oleic acid, a small sample (2 to 3 grams) of the oil to be tested. Weigh accurately in order to determine the exact weight of the sulfonated oil added to the mixture. Place the beaker on a hot plate or in a drying oven and heat at 100° to 102° C. to constant weight. Cool in a dessicator and weigh. The loss in weight indicates the amount of water present (moisture content) in the sulfonated oil. This loss divided by the original weight of the sample multiplied by 100 equals the percent of water." The above method is also suitable and widely used in the determination of the moisture content of soaps and raw oils.

41. **Nitrate**—A nitrate is a salt and is made by the action of any alkali on nitric acid. $NaOH+HNO_3=NaNO_3+H_2O$. The nitrate formed here is sodium nitrate or Chile saltpetre. Potassium nitrate, KNO_3, is commonly known as saltpetre.

42. **Oil, Fatty**—The fatty oils are the vegetable and animal oils. They differ from the mineral oils in their chemical composition, being compounds of organic acids such as stearic acid, and alcohols such as glycerine. They invariably contain carbon, hydrogen, oxygen in their chemical make-up.

43. **Oil, Mineral**—The mineral oils, or petroleum oils, differ from the fatty oils in that they are hydrocarbons, i.e. compounds containing only carbon and hydrogen. They are not acted upon by alkalis, as are the fatty oils, and hence are unsaponifiable.

44. **Oil, Neutral**—Neutral oil is mineral oil with the bloom or fluorescence removed by filtration and exposure to sunlight. The term "neutral oil" is also applied to that part of certain sulfonated oils which is still in the form of a glyceride and has not been acted upon to liberate free fatty acid.

45. **Oil, Sulfonated**—A sulfonated oil is a fatty oil that has been acted upon chemically by sulfuric acid to form sulfo-fatty acids, and then washed and the excess acid neutralized with an alkali. There is always present in sulfonated oils, to greater or less extent, water, soap, glycerine, ash, and neutral oil.

46. **Opaque**—A solution of a liquid is said to be opaque when it transmits light to such a small extent that objects cannot be distinguished upon looking at them through the liquid.

47. **Organic**—This term is applied to chemical substance or processes when they are of living (i.e. vegetable or animal) origin. All organic substances have carbon as a constituent, and usually also have hydrogen or oxygen. Fats and oils are organic substances, as opposed to the mineral acids and salts which are inorganic in nature.

48. **Oxidation**—In a limited way, oxidation is a chemical reaction between any compound and oxygen. The term has now

(*Turn to page* 42)

Market Report on

FATS, OILS AND GREASES

(As of July 25, 1929)

NEW YORK—A sudden revival of activity occurred in the market for oils, fats and greases at the start of the recent period, after a long siege of slackened interest and generally declining prices extending over the last few months. Very few items in the list escaped revision during the recent active period, and most of the changes in price were to higher levels. Coconut oil advanced sharply as a result of heavy buying by foreign interests. Foreign demand also raised the prices of grease and lard, awakening a more active domestic inquiry which caused further advances. Linseed oil was quoted materially higher as a result of tariff advances and short crop estimates. The principal decline was registered in the market for olive oil and olive oil foots. Expectation of a large crop abroad, and lessened domestic demand, combined to cause severe drops in prices, which were not checked until shortly before the close. Chinawood oil was still very firm on reports of disturbed conditions in producing areas. Corn oil was again lower. Cottonseed oil was quiet with the crude market in a nominal position. Red oil, stearic acid and the fish oils were unchanged. Palm was mentioned at advanced figures.

Chinawood Oil

Chinawood oil continued to show strength, as political conditions in China were not reported as improved. Quotations were raised to 13⅝c lb. for coast tanks, with spot stocks 1c lb. higher in bbls. or drs.

Coconut Oil

With the European margarin interests buying copra heavily in all markets, prices of copra and coconut oil rose abruptly in what approached a record advance. Manila bbls. were quoted at 8¼c in the domestic market, with tanks at 7½c. Copra advanced to 4¼c up to 4½c lb. Buyers in this market were well covered, causing the advance to ease off latterly.

Corn Oil

Corn oil was again priced lower, ranging from 7⅞c to 8c lb. for tanks at the mill. Offerings were light at these prices, and a firmer tendency was noted at the close.

Cottonseed Oil

The cottonseed oil market continued to be quiet, with the crude oil market still nominal, and P. S. Y. quotations practically unchanged. Trading was in small volume, dealers on both sides seeming willing to await further crop news before taking any very active steps.

Grease

Foreign demand bid up the prices in this market, awakening a latent domestic interest which contributed to the upward movement. Yellow and house grease were quoted at 6¾c to 7c lb., with brown at 6⅝c to 6⅞c. White grease was priced at 8¾c to 9½c lb.

Lard

The export trade also quickened the market for lard, and, coupled with a better domestic inquiry, served to advance quotations. City tierces were advanced to 12½c lb. Lard compound did not advance, closing again at 11¼c to 11½c lb.

Linseed Oil

Linseed oil scored the sharpest advance in a rapidly rising market by closing 1⅘c lb. above the figures for last month. The recent tariff advance, approved by the President, caused an automatic advance in the price of linseed oil. Following this came a report of short crop expectation, which caused another appreciable advance in the market. The area of flaxseed under cultivation has been officially reported as larger than figures for last year, but an expected decrease in yield per acre will probably cut down the total yield to about sixteen million bushels, considerably under last year's total.

Olive Oil

Expectation of a large crop of olives abroad depressed the market there, and this influence was soon felt in domestic markets. Added to this was a decreased consumption in this country, as a result of the recent castile soap decision, aiding the price decline. Prices for commercial oil declined as far as $1.00 gal. at one time during the period, but advanced again to $1.10 to $1.15 gal. at the close. Weak holders sold out at the low figures, and the market is now reported to be in stronger hands. Foots and edible oil were also quoted lower.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.14⅝	.14¾
Coast, tanks, spot	lb.	.13⅝	—
Futures	lb.	.13⅝	—
Coconut, Ceylon grade, bbls.	lb.	.08¼	.08⅜
Coast, tanks	lb.	.07¼	—
Cochin grade, bbls.	lb.	.08¾	.09¼
Manila, bbls.	lb.	.08¼	.08⅜
Tanks, N. Y.	lb.	.07½	—
Coast, tanks	lb.	.07¼	—
Fatty acids, mill, tanks	lb.	—	.10¾
Cod, Newfoundland, bbls.	gal.	.63	.64
Copra, bags, coast	lb.	.04¼	.04½
Corn, tanks, mills	lb.	.07⅞	.08
Bbls., New York	lb.	.10¾	—
Refined, bbls.	lb.	.11¼	—
Fatty acid	lb.	.09	—
Cottonseed, crude, tasks, mill	lb.	—	Nom.
P. S. Y.	lb.	.09½	.09¾
Fatty acids, mill, bbls.	lb.	.09¼	—
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03½	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bbls.	lb.	.06½	.07
Greases, choice white, bbl. N. Y.	lb.	.08¾	.09½
Yellow	lb.	.06¾	.07
Brown	lb.	.06⅝	.06⅞
House	lb.	.06¾	.07
Bone Naptha	lb.	.06⅝	—
Herring, coast tanks	gal.	.45	nom.
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.12½	—
Compound, tierces	lb.	.11¼	.11½
Middle Western, tierces	lb.	.12¾	—
Neutral, tierces	lb.	—	.13¾
Prime Western, tierces	lb.	.13	—
Lard oil, No. 1, bbls.	lb.	.11¾	—
No. 2, bbls.	lb.	.11½	—
Extra bbls.	lb.	.12¾	—
No. 1, bbls.	lb.	.12	—
Winter strained, bbls.	lb.	.13	—
Prime, bbls.	lb.	.15	—
Linseed Oil, boiled, tanks	lb.	.1210	—
Car lots, bbls.	lb.	.1290	—
Less car lots, bbls.	lb.	.1330	—
Less than 5 bbls.	lb.	.1370	—
Double boiled, less than 5 bbls.	lb.	.1400	.1430
Raw, tanks	lb.	.1170	—
Car lots, bbls.	lb.	.1250	—
Less car lots, bbls.	lb.	.1290	—
Less than 5 bbls.	lb.	.1330	—
Calcutta, bbls.	lb.	.2000	—
Refined, bbls.	lb.	.1320	.1360
Varnish grades, bbls.	lb.	.1340	.1380
Linseed cake, bags	ton	—	46.00
Meal, bags	ton	55.00	—
Menhaden, crude, tanks, Baltimore	gal.	.43	.44
Light pressed, bbls.	gal.	.67	.70
Yellow bleached, bbls.	gal.	.69	.72
White bleached, bbls.	gal.	.72	.75
Mustard, bbls.	gal.	.95	—
Neatsfoot, cold pressed, bbls.	lb.	.18¾	—
Extra, bbls.	lb.	.12¼	—
No. 1, bbls.	lb.	.12	—
Pure, bbls.	lb.	.13½	—
Oleo, No. 1, bbls.	lb.	.10¾	—
No. 2, bbls.	lb.	.09¾	—
No. 3, bbls.	lb.	.09½	—
Olive, denatured, bbls. N. Y.	gal.	1.15	1.20
Shipments	gal.	1.10	1.15
Foots, bbls.	lb.	.09	.09¼
Shipments	lb.	.09	—
Edible, bbls.	lb.	1.95	2.05
Palm, Lagos, casks, spot	lb.	.07⅞	.08
Shipments	lb.	.07¾	.07⅞
Niger, casks, spot	lb.	.07½	—
Shipments	lb.	.07⅜	—
Palm Kernel, pkgs.	lb.	.07⅝	.07¾
Tank cars	lb.	.07½	—
Peanut, crude, bbls.	lb.	.11½	—
Mills, tanks	lb.	.08½	—
Refined, bbls.	lb.	.13¼	nom.
Perilla, bbls.	lb.	.14	.14¼
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	.97	1.01
Refined, bbls.	lb.	.78	.80
Red Oil, distilled, bbls.	lb.	.10⅜	.10⅞
Tanks	lb.	.09½	—
Saponified, bbls.	lb.	.10⅜	.10⅞
Tanks	lb.	.09½	—
Salmon, coast, tanks	gal.	.44	nom.
Sardine, coast, tanks	gal.	.45	nom.
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.11	.11¼
Orient, coast, tanks	lb.	.09½	—
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15¼	.15¾
Triple pressed, bags	lb.	.17¾	.18¾
Stearine oleo, bbls.	lb.	.10	.10¼
Tallow, edible, bbls.	lb.	.08¾	.08¾
City extra, works, loose	lb.	.07⅜	—
Special, works, loose	lb.	.07	—
Tallow oil, acidless, bbls.	lb.	.10¾	—
Tanks, N. Y.	lb.	.10½	—
Vegetable tallow, coast, mats	lb.	.08⅜	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Analysis Interpretation

(*From page 37*)

been extended in chemistry to include other elements than oxygen. With reference to oils, however, oxidation is usually the chemical action of oxygen on the oil. The drying of oil is an oxidation process, the oil being acted upon by the oxygen in the air. In inorganic chemistry the rusting of iron is a good illustration of oxidation.

49. Oxy—When oxygen combines in a certain way with the fatty acid of an oil, we have oxy-fatty acids formed. They are usually of a higher titre than the fatty acids themselves and may separate out at ordinary temperature. Rancidity is often due to the presence of these oxy-acids.

50. Palmitate—A palmitate is a combination of any metal with palmitic acid and is therefore a soap. (See Soap.)

51. Potash—This is the common name for potassium carbonate. Potash is often used in the industry to designate potassium hydroxide. To be strictly correct, however, the term caustic potash should really be used, although custom has made the terms equally applicable to either the carbonate or hydroxide.

52. Precipitate—If, through a chemical reaction between solutions, a solid substance is formed which tends eventually to settle out, it is called a precipitate.

53. Precipitation—The act of forming a precipitate is called precipitation.

54. Qualitative—If, in analyzing an oil or any chemical substance, only the nature of the components and not the amount is determined, the analysis is called qualitative.

55. Quantitative—If an analysis is carried out so that not only the nature but the exact amount of constituents is determined, then the analysis is called quantitative. The amounts are usually expressed as percentages of the whole and should therefore total 100.

56. Resinate—A resinate is made by the action of any metal on rosin. The chief constituent of rosin is a fatty acid ($HC_{44}H_{63}O_5$). When an alkali reacts with this acid it forms a resinate which is therefore a soap (See Soap).

57. Salt—A salt is a compound of an alkali and an acid. Whenever any alkali reacts with any acid we invariably have formed a salt and water. It is analagous in every respect with the reaction in organic chemistry between an alcohol and an acid which gives an ester and water.

58. Saponifiable—By this term is meant "capable of being saponified." Fatty oils, such as vegetable and animal oils, can be saponified. Mineral oils cannot be saponified. The adulteration of fatty oils by mineral oils can often be detected by the presence of unsaponifiable matter. Fatty oils differ as to the amount of an alkali necessary to completely saponify them. By the analytical term "Saponification Value" is meant the number of milligrams of potassium hydroxide necessary to saponify one gram of oil. Accumulated data has shown that each oil has its own saponification value within certain limits. The presence of other fatty oils or of mineral oils as adulterant, can therefore be very often detected by the determination of this factor.

59. Saponify—To saponify a fatty oil it is treated with an alkali. This gives a soap of the fatty acid in the oil and free glycerine. Thus, if olein (See Glyceride) be treated with caustic soda, we have formed a soap, (sodium oleate), and glycerine. Mineral oils are not glycerides, cannot be attacked by alkalis, and hence cannot be saponified.

60. Saturated Solution— A solution is said to be saturated with respect to a substance when it contains in solution all of that substance it will hold at a given temperature. Any further addition of the substance will not dissolve. An addition of an entirely different substance will go into solution however. For instance, some potassium nitrate may be added to a saturated solution of sodium chloride and it will go readily into solution, whereas an addition of more solid sodium chloride will not dissolve provided the temperature is not raised.

61. Silicate—A silicate is a salt formed by the action of any alkali on silicic acid: $2NaOH+H_2SiO_3=Na_2SiO_3+2H_2O$. In this case sodium silicate is formed.

62. Soap—Soap is formed by the saponification of fats, that is, by the action of an alkali on a glyceride. It can also be formed by the action of an alkali on a free fatty acid. The alkalis usually employed are sodium and potassium hydroxides since they give soaps which are soluble in water. Soaps of other metals, such as calcium and aluminum are insoluble in water and find their uses in the manufacture of paints and in waterproofing.

63. Soda Ash—Soda ash is the common name for sodium-carbonate which has the same properties as, and is analagous to, potassium carbonate. (See Potash.)

64. Soluble—A substance is said to be soluble in another when it forms a perfectly homogeneous mixture with it within certain limits. Salt is Soluble in water but only up to a certain concentration. Alcohol is Soluble in water in all proportions.

65. Solution—A solution is the resulting mixture when two substances, one of which is soluble in the other, are brought together.

66. Solute and Solvent—When a solid dissolves in a liquid, the former is called the "Solute" and the latter the "Solvent."

67. Stearate—A stearate is a combination of any metal with stearic acid and is therefore a soap. (See Soap.)

68. Sulfate—A sulfate is a salt formed by the action of any alkali on sulfuric acid: $2NaOH+H_2SO_4=Na_2SO_4+2H_2O$. In this case the salt is sodium sulfate, commonly called Glauber's salt.

69. Sulfur Trioxide — Ordinarily called by its formula, SO_3. When an oil is sulfonated it forms a greater or lesser amount of sulfo-fatty acids. The amount of these acids formed is found analytically by the determination of the "organic SO_3." This term in an analysis therefore shows the degree of sulfonation of the oil. The terms "50% oil," "75% oil," etc., have nothing to do with the degree of sulfonation but simply show the moisture content. (See Moisture.) We may have two "50% oils" one of which is lowly sulfonated and one of which is highly sulfonated but both of which contain 50% water. Organic SO_3 varies from 2% to 8% in most sulfonated oils.

70. Superfatted—A soap is superfatted when the oil from which it was made is in excess of the alkali used to saponify it. An incompletely saponified oil is a superfatted soap, as is also a completely saponified oil to which an excess of oil or fatty acids has been added.

71. Titre — Titre is the solidification point of the fatty acids derived from a fat or oil. All pure fats and oils have a definite titre and it therefore serves as a means of identification for unknown oils.

72. Translucent—A solution or liquid is said to be translucent when the outline of objects can be but dimly distinguished upon looking at them through the liquid. It may be defined as midway between transparent and opaque.

73. Transparent—A solution or liquid is transparent when objects can be clearly distinguished upon looking at them through the liquid. All true solutions are transparent.

74. Unsaponifiable — By this term is meant "incapable of being saponified." (See Saponify.) In oil analysis the presence of unsaponifiable almost invariably denotes the presence of mineral oil or alcohols.

75. Viscosity — Viscosity is the resistance to flow. It is an important test in mineral oils since within certain limits it may be taken as a measure of the value of the oil as a lubricant. Spindle oils have a low viscosity while cylinder oils have a high viscosity.

76. Volatile—A substance is volatile if it is capable of passing off into a gaseous state under greater or less heat. By volatile substances are usually meant those that evaporate readily at ordinary temperature. Alcohol and ether are highly volatile. Oils are practically non-volatile.

77. Volumetric—When a constituent of a compound or mixture is determined by the use of standard reagents and the volumes of the reacting solutions are used to determine the percentage of that constituent present, the analysis is said to have been volumetric. This is in contradistinction to the gravimetric method in which weights are used instead of volumes.

March wood oil shipments from Hankow amounted to 3,353 short tons of which 3,038 tons went to the United States and 497 tons to Europe. Available stocks at Hankow at the end of the month were estimated to be 5,300 short tons. Reliable information regarding stocks at Wanhsien and Changteh is not available. Much of the stocks coming in during March are reported to have been adulterated.

Preliminary statistics show that during the first quarter of 1929 Sweden imported 23,460 tons of oilseeds of which soya beans comprised 17,034 tons. During the same period of 1928 Sweden imported 38,691 tons of which soya beans accounted for 30,843 tons. During the first quarter of 1929 Sweden imported 23,162 tons of oilcake as compared with 31,494 tons during the same period of 1928. This total figure of oilcake includes peanut, cottonseed, and sunflower seed.

The gingelly (sesame) crop of the Madras Presidency is estimated by the Department of Agriculture of the Madras Presidency to be 217,056,000 pounds as against 239,456,000 pounds in the previous year, and an average yield of 233,294,000 pounds in the previous year, and an average yield of 233,296,000 pounds.

OIL & FAT INDUSTRIES

The Editor's Page

Government Activities

DURING the past month or two, inspectors of the Food Division of The Department of Agriculture have been visiting the plants of various manufacturers of mayonnaise and other fatty food products, requesting data at first hand about the manufacture and composition of the products being produced. It is stated that in some instances original formulas were requested. At the time these visits from the inspectors began, they caused considerable resentment and uncertainty among some of the manufacturers whose establishments were inspected. The object of the inspections is evidently to discover at the source which products violate the law when shipped in interstate commerce and which do not.

Although under the law, it seems, manufacturers are not compelled to permit inspection of their plants by representatives of the Food Administration, the idea behind the inspections is better considered before judgment is passed. The object of the inspections must be to get a line on those who violate the law. Taking samples shipped in interstate commerce and prosecution is a later detail. Those manufacturers who do not violate the law, should have nothing to fear from this angle. At the same time, to reveal equipment, operating methods, and above all, formulas, to an inspector who might perchance, at some later date, leave the Government employ and engage in a similar business, is not reassuring. Manufacturers do not give out information of this kind to anybody willingly, even to a Government department. Fear of future pressure, direct or indirect, is probably the chief reason for revealing trade secrets where they are revealed.

The activity of the Food Administration is unquestionably aimed at products which do not conform to the law. Manufacturers who are incensed at this form of governmental snooping should bear in mind that it is aimed primarily to uncover those who are likely to break the law, or are breaking the law, and hence to protect the honest manufacturer as well as the public.

To the Government officials, it can well be said that, although the aims of their plan to get the real facts at the source may be of the highest, activity of this type tends to antagonize business which does not break the law and has no intention of breaking it. The plan theoretically may have some value, but from the angle of law enforcement, we believe that it will not work out well in the long run.

The Tariff Compromise

LOOKING at the tariff rates on oils and fats as they have been reported out by the Senate Finance Committee, gives the impression that the Senate Committee has attempted to placate both sides. The rates on various oils suitable for edible purposes have been increased in a number of cases and oils which were on the free list have been placed on the dutiable list. Where these same oils are destined for the soap kettle or for other non-edible purposes, the plan of denaturation to render them unfit for food uses has been written into the bill. These denatured oils remain free of duty.

The chief demand for a higher duty on imported oils and fats has come from those quarters primarily interested in the production of food oils and from dairy and farm interests. The object has been first to permit the domestic producer of cotton oil, peanut oil, corn oil, and soya bean oil to sell his oil at a higher price, and second, to eliminate some of the competition for dairy products now present in margarins made from low cost imported oils. If the great proportion of American produced oils go into food products, which we believe they do, then a higher duty on the *edible* grades only of imported oils should give the American dairy and oil interests the protection they ask.

The largest consumer of non-edible imported oils is, of course, the soap industry. That it should wage a bitter fight against having its oils taxed is only natural. It has maintained that its raw materials play no part in the production of fatty food products and that it would not be a larger consumer of American produced oils even if the high tariff rates be-

came law. It suggested and fought for the denaturation plan for this reason.

If those who really represent farm interests in the tariff fight have been sincere, the tariff bill as reported out by the Senate should give them what they have desired. We are inclined to believe, however, that there have been many who have masqueraded as farmers, but who in reality are something different. To them, the bill is unsatisfactory, even though the Senate Committee has apparently attempted to please both sides.

Chemists' Committee Named

PRESIDENT W. R. Stryker has appointed a Committee of New York members of The American Oil Chemists' Society, to assist Mr. A. K. Church, Vice-president for the Soap Section, in the conduct of the Fall Meeting of the Society, which will be held at New York some time after October 1. The definite date and the program of the Meeting will be announced at a later date. Mr. Stryker and Mr. Church urge all members of the Society to attend the Meeting, particularly members of the Soap Section, to whom the program will be of especial interest. The Meeting Committee, as appointed by President Stryker, consists of the following members: H. P. Trevithick, David Wesson, A. P. Lee, W. A. Peterson, R. W. Bailey. Mr. Trevithick has consented to act as Chairman of the Committee, and all communications concerning the meeting and about papers to be presented thereat should be addressed to Mr. H. P. Trevithick, 2 Broadway, New York City. All chemists having an interest in the chemistry of soaps or soap materials are invited to become members of The Soap Chemists' Section of The American Oil Chemists' Society. Address the Secretary, Mr. W. A. Peterson, Kirkman & Son, 215 Water Street, Brooklyn, New York.

Tung Oil Fourth Chemical Import

CHINESE tung oil is the fourth largest chemical import of the United States, according to E. C. Wood, chemical division of the Department of Commerce.

Tung oil, also called China wood oil, is obtained from nuts of two varieties of trees, known as the Aleurites montana and the Aleurites fordii. These trees are indigenous to China, which at present is the world's source of supply. The former type is confined largely to the southern province of Kwangsi and Yunnan, and the latter to the provinces of Szechwan, Hunan, Kweichow and Hupeh. The Aleurites fordii is the tropical and hardier tree and supplies over 90 per cent of the total production of tung oil.

The Chinese for many years have had numerous uses for the oil, such as a dressing for leather, the manufacture of soap and varnish, and for waterproofing paper cloth, umbrellas, shoes and silk, pongee and other materials. Chinese ink is prepared by burning the oil cake. The most important use is for finishing and waterproofing Chinese junks and other boats. In the form of paste made by burning the nut to a soot and, mixed with oil, it finds extensive employment in the calking of boats.

Since the importation of the oil into the United States the uses of the commodity have multiplied. On account of its rapid drying and waterproofing properties it was discovered that an excellent spar varnish could be produced to replace copal varnish. Other large consumers are the linoleum and oilcloth industries, and manufacturers of enamel and floor, deck and wall paints. Considerable quantities also are used in the preparation of insulating compounds and for brake bands for automobiles.

Shipments of oil from China to America are made from the ports of Hankow, Shanghai and Hong Kong. The greater portion of the supply originates in Hankow. Transportation of tung oil to the United States is principally in tank steamers, and on arrival at destination it is pumped into barrels, drums or tank cars. Last year the United States imported 107,356,971 barrels, valued at $13,419,029, compared with 89,650,411 barrels at $11,809,583, in 1927.

Although domestic production of tung oil is as yet comparatively nil, scientific care in the cultivation and fertilization of tung oil trees in Florida has resulted in an oil reported superior in quality to the imported product.

Foreign Trade Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces that its representatives in all parts of the world have forwarded the following trade inquiries of interest to our readers. In writing the Bureau in reference to any of these inquiries please mention that you saw it in *Oil & Fat Industries*.

No.	*Location*	*Material*	*Purchase or Agency*
39466	Germany	Lard	Purchase
39480	Germany	Lard	"
39591	Germany	Lard	Both
39813	Ecuador	Lard	Purchase

Vegetable Oil Production in Brazil

Extensive Natural Resources in Oil-bearing Seeds Offer Opportunities for Commercial Exploitation

By J. B. DE MORAES CARVALHO

Young palm nut trees (Elaeis guineensis) in the first year of bearing.

IN this short article it is only possible to survey the problem of the utilization of Brazilian oils for industrial and commercial purposes. But as I have visited every oil factory in the country from the Amazon to Rio Grande de Sul, and studied them in all their aspects, my personal observations on this problem may be of interest to the industries concerned, and may be compared with the facts collected by independent scientists.

Brazil, with its 8,511,189 square kilometres and possessing the most varied climates, can supply the world with every kind of fatty vegetable substance; but this great wealth is buried in forests, only a small area being cultivated with cotton, coconut, "mamona," monkey nuts, "gergelim," and flax. The oleaginous nuts are an important and varied group, the first place being accupied by the "babassu," the oil of which is used to greater advantage in the margarine industry than coconut oil.

American Machinery Predominant

THE first Brazilian oil factory was founded in 1875 in Rio de Janeiro. Until the European War British manufacturers were the most important suppliers of machinery for the oil factories, and of the 73 factories existing in Brazil in 1922 some 40 used British ma-

chinery. American, German, French, and Italian presses, as well as those of local manufacture, are found in smaller numbers. But the best factories in the country today have American installations; this applies especially to the extraction of cottonseed oil, which is carried out in the majority of factories by the American process. Of the 43 cottonseed oil factories only 14 use the English process of extraction (oil from undecorticated seeds), but these 14 installations are also used for other oils. The reason for the American hold on the market is simple. While cotton has long been exploited in the country for its fibre, it was only during and after the war that the exploitation of cottonseed oil was greatly developed. At this time British machinery was not available; the Government lent large sums for the installation of modern factories of American type for the extraction of cottonseed oil, and there is no doubt that the best installations are to be found in these factories.

The oil manufactured on the largest scale is summer oil, while winter oil and salad oil (deodorized) are also manufactured at present by three factories in the country. Summer oil is exported on a large scale to Great Britain and other countries, the exporters for certain purposes signing contracts made out in accordance with the rules employed by the Incorporated Oil Seed Association and the London Oil and Tallow Trade Association. On the other hand, the internal trade in seeds, oils, soapstock, cake, or meal is not yet regulated, and no certain basis exists for dealings between manufacturers. Bills are discounted after an investigation of the standing of the manufacturer concerned, and an arrangement is made according to the merits of each.

Of the 43 cottonseed oil factories in Brazil not more than ten are acquainted with the use of Lovibond's tintometer for oil refining, so that the rules of the Inter-State Cotton Seed Crushers' Association are not as yet widely applied in Brazil. But during the International Cotton Congress of 1922, it was proposed, after hearing the views of the most important manufacturers interested in cottonseed oil, and after studying the manufacturing facilities of each factory, that there should be established various standard types in oils and cakes or "farellos", which, being less stringent than the Inter-State rules, could serve to regulate this branch of trade. The large cottonseed oil factories, however, can produce cakes of the same standard as the American.

The possibilities of Brazil as a producer of cotton are incalculable. It possesses fertile land suitable for an abundant cultivation of cotton, and the tendency of the consumption of cottonseed oil is to increase. Manufacturers do not advertise their salad oil—the manufacture of which from cottonseed oil was started in 1920 with American machinery—but its consumption has increased sufficiently to justify the installation of new factories. However, in spite of the fact that the salad oil prepared in Brazil is as good as the American, Brazil in 1928 imported more than $4,250,000 worth of this oil. The value of imports of salad oil in 1923 was about $1,500,000 and in 1927 about $2,900,000.

At the seventh International Vegetable Oil Congress, held in Seville in 1924, it was said that cotton oil and colza oil were exported to Brazil and other South American countries as olive oil. It will be a task of the laboratory of which I am in charge to investigate this assertion. But the Public Health Department, which analyzes all vegetable oils used in foodstuffs, informs me that in a small number of samples of imported olive oil some cottonseed oil has been found.

Another oil which can be substituted for olive oil is "pataua" oil, derived from the palm nut Oenocpus Batava Mart. Its similarity to olive oil is so great that writing on the subject in the "Analyst" of December, 1927, the British scientists E. R. Bolton and Hewer said: "The oil bears a striking resemblance to olive oil, and, save for a distinctly lower refractive index and a hardly appreciably lower iodine value, the analytic constants are strikingly similar, including its specific gravity of 0.9158. Methods of rapidly distinguishing this oil from olive oil are specially needed in view of the fact that it is eminently suitable as a salad oil and would prove an excellent edible generally." Bolton, too, on page 152 of his magnificent work, "Oils, Fats, and Fatty Foods," republished in 1928, says; " 'Pataua' oil is like olive oil in many respects, including appearance and chemical characteristics; and it behaves in a similar way when subjected to Bellier's test as modified by Evers." This oil is only manufactured in Para on a small scale and enjoys a great demand in the country.

The Babassu Kernel

THE kernel of the babassu nut, (*Orbignia speciosa Barb*), Rodrigues, is today the most important item in the trade of the State of Maranhao, and its exploitation is increasing rapidly. Germany imports almost two-thirds of the production, and American, Belgian, French, and British companies are also interested in this industry. The difficulty in the way of increasing exportation is the lack of

a machine which can be an economic substitute for hand labor to break the shells without damaging the kernels.*

Bolton, in his examination of the babassu nut on page 174 of the above-mentioned book, writes: "The oil is closely allied to coconut oil and is very similar in appearance and composition, but lower in melting-point as a result of the higher proportion of unsaturated glycerides . . . The refined oil is suitable for margarine and general edible use, and the crude oil for soapmaking, serving in a similar manner to coconut oil." William Clayton, referring to the babassu in his work "Margarine," says, on page 8: "It is anticipated that this fat will figure prominently among vegetable fats intended for margarine manufacture in the near future." For soap manufacture this oil has also been widely used, both in Brazil and other countries. The importance of the babassu nut can therefore be easily appreciated, and there are at present in Brazil 16 factories engaged in extracting the oil from its kernels.

The coconut (*Cocos nucifera*) is exploited in Brazil on a small scale in proportion to the length of the Brazilian coastline and the vast areas suitable for its cultivation. The coconut is still chiefly utilized in Brazil for its coconut water (milk), and hence its substitution by the babassu. The copra nut is produced on a small scale, and not more than eight factories use it for the extraction of oil. Castor seed is cultivated in the country, and 26 factories extract this oil. This seed is exported to the United States and other countries, while the oil is exported to the Argentine.

Flax is cultivated on a small scale in the south of the country for consumption by local factories and factories in other States. Since this trade is not under official inspection, the oil is very much adulterated. As a substitute for flax, oil manufacturers and business men have sought to extract oil from the "oiticica," which has been studied by American and English experts, the opinion of Bolton being that "it is probable that this oil may prove an exceedingly useful one to the varnish-maker, though some difficulties in its commercial extraction are to be expected. Various firms are already experimenting with the oil, and it is likely that larger quantities will soon reach this country." Several factories import flax from the Argentine and extract the oil for sale in the country and for export with the "cakes" to other markets.

Many other seeds and oleaginous nuts are exploited in Brazil, and consumption of them has increased. In the State of Bahia, for instance, the "pindobassu," "piassava," "uricury" and other nuts which produce a fat less rich in solid fatty acids than the fat of the babassu are also utilized by the oil factories. In this State palm oil is extracted and consumed as a foodstuff, the palm-kernel oil being despised.

The oil manufacturers of Brazil are daily becoming more convinced of the advantages of the employment of capital in this industry, which is thus becoming better developed from the technical point of view. In Sao Paulo there has been installed all the machinery necessary for the extraction and solution of oil existing in oleaginous "tortas" (cakes) left by small factories after the first pressing; good results have been obtained by this process, which is now employed by one factory in the country.

Summary

FROM this short description it may be concluded that in Brazil there already exist good factories for the extraction of cottonseed oil by the American process, good refineries and factories for vegetable butter and similar products, and that it would be in the interests of American capitalists to study the possibilities of this industry in Brazil. In 1928 Brazil exported oleaginous seeds to the value of 71,835 contos, and 733 contos' worth of vegetable oils. However, as the Government of Brazil is keenly interested in the exploitation of the nuts and seeds, the Secretary of Agriculture has been able to obtain from the Federal Congress the necessary means for the installation of a laboratory for the specialized study of oils and their sub-products.

This laboratory forms part of the Escola Superior de Agriculture, a Federal institution, and its equipment, with the exception of the Zeiss material, was purchased in the United States. It possesses all the apparatus necessary for the control of oils, fats, waxes, and resins, and for research work on those products. Besides the departments of analysis and research, it has an industrial department, in which there will be installed within the next two months the most modern equipment of American manufacture for the extraction of cottonseed oil by the American process and of oil from other seeds rich in fat (coconut, babassu, and other nuts), and for the manufacture of soaps and other articles.

The Government has also inaugurated a specialized course in vegetable oils and derivatives; this will be the first post-graduate course es-

(*Tunrn to Page* 43)

* Note—An American firm has perfected such a machine, several units of which are now in operation.

Chia Seed Oil

Contribution From Oil, Fat and Wax Laboratory Bureau of Chemistry and Soils, United States Department of Agriculture

By WALTER F. BAUGHMAN and GEORGE S. JAMIESON

THE chia plant (*Salvia hispanica* L.), a shrub that reaches about five or six feet in height, is widely cultivated and grows wild in Mexico, where the seed is used for the preparation of a beverage that resembles "flax seed tea." Another species of the same genus (*Salvia columbariae* Benth.) grows in California, Nevada, Arizona and New Mexico.

A quantity of the seed of *Salvia hispanica* was obtained from Mexico by Henry A. Gardner[1]. The oil was expressed by means of an expeller in the writers' laboratory, and the yield after being filtered was a very clear oil of a light amber color.

Gardner and Holdt reported that the seed contained 33.8% of oil. They also determined the drying properties of the oil[2]. They found that the oil in the raw state dried rather slowly and exhibited pronounced "crawling" or tendency of the film to form drops. When a drier was added it dried as fast as linseed oil. The "crawling" tendency was practically overcome be heating the oil at 210° C. for fifteen minutes, and then the oil showed drying results even superior to linseed oil treated with the same amount of liquid drier. After heat treatment for bodying there was scarcely any change in color, which fact indicates that it would be suitable for light colored varnishes.

Some of the oil expressed for Mr. Gardner was used by the writers for the determination of its composition.

Chemical and Physical Characteristics

THE more important characteristics are reported in Table I. The iodine number is 5 to 10 points higher than the average figure. for linseed oils, and the hexabromide number[3] is about the same. The percentages of saturated and unsaturated acids were determined by the lead salt-ether method, and corrections were made for the small quantity of unsaturated acids that remains with the saturated acid fraction[4]. The percentage of unsaturated acids also has been corrected for the unsaponifiable matter, which separates with the unsaturated acid fraction.

Unsaturated Acids

THE composition of the unsaturated acids was calculated from the iodine number (190.0) and the thiocyanogen-iodine number (113.2) of the oil according to the Kaufmann method[5] which is based on the fact that linolenic acid quantitatively attaches thiocyanogen to two of its double bonds while linolic and oleic acids attach it to one double bond. The results from this calculation are given in Table II.

Table I

CHIA SEED OIL

Chemical and Physical Characteristics

Specific Gravity, 25°/25°	0.9358
Refractive index, 20°	1.4838
Acid value	1.4
Saponification value	194.8
Unsaponifiable matter (%)	0.7
Loss of weight when heated 3 hrs. at 110° C. in CO_2 atmos. (%)	0.3
Iodine number (Hanus)	190.0
Thiocyanogen-iodine number	113.2
Hexabromide number of total fatty acids	51.2
Saturated acids (corrected) (%)	8.1
Unsaturated acids (corrected) (%)	85.2
Iodine number of unsaturated acids	214.6

Table II

CHIA SEED OIL

Unsaturated Acids in Original Oil

	Acids %	Glycerides %
Linolenic	39.3	41.1
Linolic	45.2	47.2
Oleic	0.7	0.7
	85.2	89.0

The hexabromide number (51.2) is equivalent to 48.1% hexabromide for the oil and this in turn to 17.6% of Alpha—linolenic acid in the oil. The difference between this number and the total linolenic acid percentage is 21.7% and is considered to represent Beta—linolenic acid, which forms a liquid hexabromide.

The presence of oleic acid was determined by oxidizing a portion (30 grams) of the unsaturated acids with a dilute alkaline solution of $K_2Mn_2O_8$ at room temperature[6]. The dihydroxy acid was separated from the tetrahydroxy acid by dissolving it in ether. Although a large volume of ether was used only a small quantity of substance was dissolved. This was recrystallized four times from alcohol. Its melting point then was 130°. The melting point of 9-10 dihydroxy-stearic acid is 132°.

Saturated Acids

A QUANTITY of the saturated acids was separated from the oil by the lead salt-ether method and esterified with methyl alcohol[7]. The mixture of methyl esters was fractionally distilled under diminished pressure. The data for the distillation is given in Table III. A preliminary distillation from a 500cc. Claisen flask divided the mixture into four fractions and a residue. These preliminary fractions and the residue were redistilled from a 150 cc. Ladenburg flask according to the manner indicated in the table; five fractions and a small residue were obtained.

Table III

CHIA SEED OIL

Fractional Distillation of Methyl Esters of Saturated Acids

(77.55 g. subjected to distillation)

Preliminary distillation under 17 mm. pressure—

	Fraction	Temperature °C.	Weight G.
	A	203-5	20.30
	B	205-6	23.80
	C	207-12	21.20
	D	213-30	9.50
	Residue		2.75
Final distillation under 2 mm. pressure—			
Fraction A and B added	1	155-7	6.25
	2	158-9	23.00
Fraction C added	3	160-4	23.25
Fraction D added	4	168-73	14.20
Residue added	5	185-210	9.80
	Residue		0.80

The iodine numbers and the saponification values of the five final fractions are recorded in columns 2 and 3, Table IV. The iodine numbers are measures of the contaminating unsaturated acids. From these data, the mean molecular weights of the saturated esters in each fraction were calculated, and the results are given in column 6[8]. The results in column 6 indicate what saturated acid esters may be present in the fractions. The figure for Fraction 1 lies between methyl-myristate (242.3) and methyl-palmitate (270.3) and indicates

Table IV

CHIA SEED OIL

Results of Analyses of Fractions Obtained by Distilling Methyl Esters of Saturated Acids

Fraction	Iodine Number	Saponification Value	Mean Molecular Weight	Esters of Unsaturated Acids %	Mean Molecular Weight of Esters of Saturated Acids	Myristic Acid %	Myristic Acid Grams	Palmitic Acid %	Palmitic Acid Grams	Stearic Acid %	Stearic Acid Grams	Arachidic Acid %	Arachidic Acid Grams
1	3.3	211.8	264.9	1.61	264.5	19.20	1.20	73.97	4.62				
2	2.0	205.0	273.7	0.98	273.6			82.87	19.06	11.07	2.55		
3	4.6	201.0	279.1	2.25	278.8			64.65	15.03	28.18	6.55		
4	7.0	194.2	288.9	3.42	288.8			31.28	4.44	60.51	8.59		
5	8.7	183.5	305.7	4.25	306.3					65.51	6.42	25.85	2.53
Residue													0.40
							1.20		43.15		24.11		2.93

that this fraction consists of these two esters. The results for Fractions 2, 3 and 4 suggest mixtures of methyl palmitate and methyl stearate (298.4), while the probable constituents of Fraction 5 are methyl stearate and methyl arachidate (326.4).

These deductions were confirmed by recovering the free acids from some of the fractions and isolating them by fractional crystallization from alcohol. Their identities were established by their melting points and by observing whether or not these melting points were lowered when the substances were mixed with equal quantities of the respective acids which they were suspected of being, the purity of which had been established previously by elementary analyses.

Myristic acid ($C_{14}H_{28}O_2$) melting at 54°—55° C. and palmitic acid ($C_{16}H_{32}O_2$) melting at 63° C. were isolated from Fraction 1. From Fractions 2 and 4 were obtained palmitic acid and stearic acid ($C_{18}H_{36}O_2$) with a melting point of 69° C. A considerable quantity of arachidic acid ($C_{20}H_{40}O_2$) which melted 77° C. was crystallized frrom Fraction 5, and 0.40 gram of this acid was separated from the residue.

The quantities of the saturated acids in the fractions were calculated from the mean molecular weights of the esters (column 6, Table IV) and the theoretical molecular weights of the two esters in each fraction.

The percentage composition of the saturated acids is recorded in column 2, Table V. The percentages of saturated acids in the original oil are given in column 3, and the equivalent percentages of glycerides are furnished in column 4.

Table V
CHIA SEED OIL
Saturated Acids

	Acids in Saturated Acid Fraction Grams	Acids in Saturated Acid Fraction %	Acids in Original Oil %	Glycerides in Original Oil %
Myristic	1.20	1.68	0.14	0.1
Palmitic	43.15	60.45	4.90	5.1
Stearic	24.11	33.77	2.73	2.9
Arachidic	2.93	4.10	0.33	0.3
	71.39	100.00	8.10	8.4

Summary

THE results of the determination of the chemical composition of chia seed oil are furnished below. The composition of two samples of linseed oil determined by Kaufmann and Keller[9] is given for comparison.

		%		Linseed Oil LaPlata %	Linseed Oil Calcutta %
Glycerides of	Linolenic	41.1		36.3	42.0
	Linolic	47.2		46.6	34.1
	Oleic	0.7		7.9	12.4
	Myristic	0.1	Saturated acid glycerides plus unsap. matter	8.6	10.8
	Palmitic	5.1			
	Stearic	2.9			
	Arachidic	0.3			
Unsaponifiable matter		0.7			
Loss of weight when heated 3 hours in CO_2 atmos.		0.3			

The chia seed oil contains a very small amount of oleic glyceride—much less than linseed oil, practically the same amount of linolenic glyceride as the Calcutta linseed oil, and more than the LaPlata linseed oil. One would expect its drying power, therefore, to be equal or somewhat superior to that of linseed oil.

[1] Educational Bureau, American Paint and Varnish Manufacturers' Association, Washington, D. C.

[2] H. A. Gardner and P. C. Holdt, Paint Manufacturers' Assoc. U. S .Bul. 105 (1920).

[3] Lawrence L. Steele and Frederick M. Washburn, Ind. Eng. Chem., 12, 52 (1920).

[4] J. Amer. Chem. Soc. 42, 2398 (1920); Cotton Oil Press, 6, No. 1, 41, (1922).

[5] H. P. Kaufmann and M. Keller, Z. Angew. Chec 42, 20 & 73, (1929).

[6] Lewkowitsch, "Chemical Technology and Analysis of Oils, Fats and Waxes," Macmillan Company, 6th ed., 1, 574, (1921).

[7] J. Amer. Chem. Soc. 42, 1200 (1920).

[8] J. Amer. Chem. Soc. 42, 152 and 1197 (1920).

[9] loc. cit.

The Roessler & Hasslacher Chemical Co. will be in its new quarters at 10 East 40th street, New York, on May 13; telephone Lexington 2550.

The Chicago sales offices of the Bisbee Linseed Co. have been moved to the mill at Main and Butler streets, Chicago Heights; telephone, Pullman 8757.

Senate Committee Reports Tariff Bill

Rates of Duty on Oils and Fats Reduced in Most Instances Below Those of the House Bill

ON August 20th, the Finance Committee of the Senate reported to that body the rates agreed upon by the majority of the committee for the Smoot-Hawley Tariff Act. The committee has dealt most fairly with the oil and fat and soap industries of the country, fixing rates which, while giving the farming interests a measure of protection, will not place a substantially greater burden upon the consumers of oils and soaps. The duties in which readers of *Oil & Fat Industries* are most interested were reported as follows:

Par. 1.
Red oil or oleic acid is restored to the 1922 rate of duty which is 1½c per pound. Stearic acid remains in the basket clause of the Senate Bill at a duty of 25% ad valorem. The 1922 rate was 1½c per pound.

Par. 43.
Glycerine, crude and refined, remains at the 1922 rate of duty.

Par. 53. ANIMAL AND FISH OILS.
This paragraph is unchanged with the exception that sperm oil, formerly dutiable at 10c per gallon has been reduced to 6c per gallon. Duties on whale oil, seal oil, etc., remain unchanged.

Par. 54. VEGETABLE OILS.
Castor oil remains at 3c per pound, hempseed at 1½c, linseed has been reduced from the House rate of 4.16c to 3.7c per pound. Rapeseed oil remains at 6c per gallon but is allowed duty free entry if denatured, which is a concession not in the House Bill nor the Tariff Act of 1922. All expressed or extracted oils not specially provided for remain at 20% ad valorem.

Par. 55. VEGETABLE OILS.
Coconut oil remains at the old rate of duty of 2c per pound, and coconut oil from the Philippines is allowed duty free entry. Cottonseed oil, 3c per pound; peanut oil, 4c per pound, the old rates of duty; palm kernel oil, 1c per pound *but free if denatured* which provision was in the House Bill; sesame oil, 3c per pound *but duty free if denatured*, this provision not being in the House Bill. Soya Bean oil, held dutiable at 5c per pound in the House Bill, has been reduced 2.8c per pound, but not less than 45% ad valorem.

Par. 56.
Alizarin Assistant, turkey red oil, sulphonated castor oil, etc., remain at the 1922 rate of duty of 35% ad valorem.

Par. 57.
Hydrogenated oils and fats held dutiable in the Tariff Act of 1922, and the House Bill at 4c per pound, have been reduced to 3c per pound.

Par. 58.
Combinations and mixtures of animal, vegetable and mineral oils take a rate of duty of 25% ad valorem, but not less than the rate applicable to the component material subject to the highest rate of duty, this being the same language as in the House Bill.

Par. 701.
Tallow remains unchanged from the 1922 rate at ½c per pound, and oleo oil and oleo stearine remain at 1c per pound.

Par. 703.
Lard, 3c per pound, lard compounds and lard substitutes 5c per pound.

Par. 709.
Butter and oleo margarine remain at the House rate of duty, to wit, 14c per pound.

Par. 730.
Mill feeds and mixed feeds remain at the old rate of duty, but a special duty of 3/10 of one cent per pound is placed on soya bean cake and soya bean cake meal. *All other kinds of oil cake and meal remain on the free list.*

Par. 757.
Peanuts not shelled 4¼c per pound; shelled 6c per pound, the latter being a reduction of 1c per pound from the House rate of duty.

Par. 760.
Oil bearing seeds and materials: castor beans remain at ½c per pound, flaxseed is reduced from the House rate of duty of 63c per bushel to 56c per bushel, soya beans 2c per pound, cottonseed 1/3c per pound.

Par. 1727. OIL BEARING SEEDS AND NUTS, COPRA, ETC.
Copra, *inclusive of copra from the Philippines*, hempseed, kapok seed, palm nuts, palm nut kernels, tung nuts, rapeseed, rubber seed, perilla and sesame seed are given duty free entry. Kapok seed and rubber seed represent additions to the free list to the Tariff Act of 1922 and the House Bill.

Par. 1730.
Oil cake and oil cake meal are given duty free entry with the single exception of soya bean cake meal.

Par. 1731.
Cod oil and cod liver oil remain on the free list.

Par. 1733.
Oils expressed or extracted now on the free list, either in their natural state or if denatured are as follows: Croton, palm, perilla, and sweet almond; olive, palm-kernel, rapeseed, sunflower, and sesame oil, rendered unfit for use as food or for any but mechanical or manufacturing purposes, by such means as shall be satisfactory to the Secretary of the Treasury and under regulations to be prescribed by him; tung oil, and nut oil not specially provided for. *Rapeseed oil, sunflower oil,* and *sesame oil* represent additions not in the House Bill. They are, it will be noted, admitted duty free if denatured. Rapeseed oil was formerly dutiable at 6c per gallon, sunflower oil at 20% ad valorem and sesame oil dutiable both in the Senate and the House Bill at 3c per pound in its natural state is allowed duty free entry if denatured.

Par. 1780.
Tankage, fish scrap, fish meal, cod liver oil cake and cod liver oil cake meal, all the foregoing unfit for human consumption, duty free.

Par. 1791.
Turpentine, gum and spirits of, rosin, duty free.

Par. 1795.
Vegetable tallow, duty free.

Par. 1797.
Wax, animal, vegetable, or mineral, duty free.

MISCELLANEOUS ITEMS

Par. 70.
Bone black, bone char, and blood char have been reduced from 25 to 20% ad valorem which was the 1922 rate of duty. Other decolorizing, deodorizing chars and carbons remain at the House rate of 45% ad valorem.

Par. 80.
Sodium, potassium 25% ad valorem.

Par. 82.
Soda ash ¼c per pound. Caustic soda ½c per pound.

Par. 85.
Dextrine (from potato starch) 3c per pound, dextrine not otherwise provided for, and dextrine substitutes 2c per pound.

Par. 206.
Pumice stone valued at $15 per ton or less, 1/20 of one cent per pound, a reduction from the House rate which was 1/10 of one cent per pound. Pumice stone worth more than $15 per ton, 1/8 of one cent per pound, dutiable in the House bill at ¼c. Wholly or partly manufactured, ¾c per pound as compared to 55/100c in the House Bill.

Par. 207.
Fullers earth, unmanufactured, remains at $1.50 per ton; wrought or manufactured $3.25 per ton.

Par. 310.
Tin plate 1c per pound.

Par. 408.
Boxes, barrels and box shooks 15% ad valorem.

Par. 1008.
Burlap unchanged at 1c per pound.

Determining Bleaching Loss Coefficients

A Laboratory Test for Oil Retention of Bleaching Earths and Carbons

By A. S. Richardson, J. T. R. Andrews and R. G. Folzenlogen

The Procter and Gamble Co., Ivorydale, Ohio

ADSORPTION bleaching materials are not evaluated solely on a basis of bleaching efficiency and cost per ton. An important consideration is the loss or degradation of the oil retained by the filter cake. Frequently this factor outweighs the original cost of the earth or carbon to such an extent that the higher priced material may be actually the cheaper to use.

Admittedly plant experience is the best method of determining oil retention, but plant scale experiments are costly and are inapplicable to small samples. Bailey and Allen[1] have devised a comparative laboratory test which may be employed when only a few grams of material are available. This method possesses the advantage of requiring very simple equipment, but involves considerable personal equation. There is need of a laboratory method which, in the hands of different operators at different times, will give correct comparative values for the oil retention of bleaching materials. To meet this need, the method described below is proposed, being based on the gain in weight of the bleaching material after an excess of oil has been removed in a stream of hot, inert gas.

The test has been applied to about 500 earths and carbons and has given satisfactory comparative results which approximate those obtained in plant practice. It requires less than 10 grams for duplicate determinations.

Apparatus

THE equipment is shown in Figure 1. To a liter suction flask is fitted a Gooch crucible of 35 mm. outside diameter and 40 mm. height. A disk of muslin is cut to fit into the bottom of the Gooch crucible. Any convenient apparatus for delivering an excess of dry, hot carbon dioxide into this crucible may be provided. For heating the gas, we have used a piece of standard 2 inch pipe about 8 inches long with closed ends pierced by holes through which is fitted a ¼-inch copper tube of 10 inches length. The iron pipe is filled with dry sand packed closely around the copper tube, in order to minimize temperature fluctuations. Inside the copper tubing is placed a piece of

[1] Cotton Oil Press, Vol. 7, No. 8 pp. 36-37 (Dec. 1923).

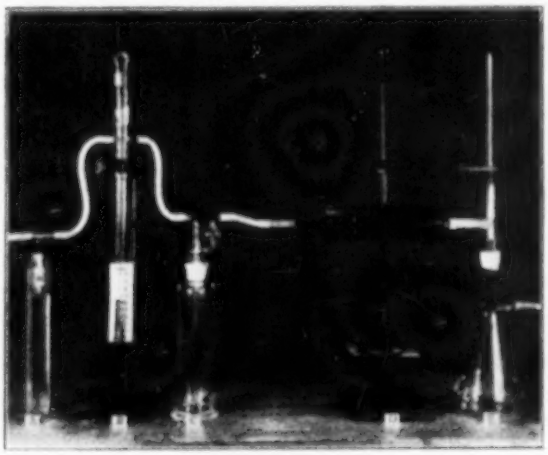


Fig. 1 *Apparatus*
A, bottle for relief of gas pressure. B, flowmeter. C, liquid trap. D, furnace. E, suction flask with crucible containing bleaching material.

Pyrex glass tubing which fits snugly and is about 14 inches in length. On one end is sealed a vertical T tube in which is held a thermometer for measuring the temperature of the carbon dioxide. The lower end of the T tube holds a cork stopper designed to fit loosely into the top of the crucible. The furnace is heated by means of a wing top gas burner. Carbon dioxide from an ordinary cylinder is passed through a T tube connected with a safety bottle or other suitable means for emergency relief of excess pressure, through a flow meter followed by a trap of size sufficient to hold any liquid which might accidentally be blown over from the manometer of the flow meter, and thence to the furnace already described. Vacuum is produced in the suction flask by use of a water pump.

Method of Operation

THE flow of carbon dioxide is adjusted to 4-5 cubic feet per hour and the heating of the furnace regulated so that the temperature of the carbon dioxide is 145-155°C. at the position of the thermometer. The Gooch crucible is fitted on to the filter flask, the muslin disk is placed in the bottom of the crucible, and the suction pump is started. About 5 cc.

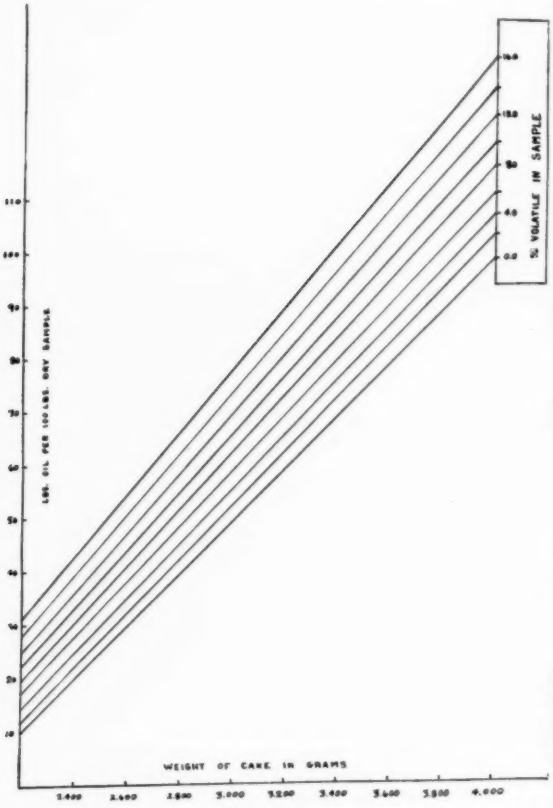


FIG. 2
Chart for calculating oil retention from weight of blown cake and % volatile in original sample.

of dry, clear cottonseed salad oil heated to 105-10°C. is poured over the muslin disk in order to cause it to adhere properly to the bottom of the crucible. Next 2.000 (±.001) grams of the earth or other bleaching material is transferred from a glazed paper to the crucible, with use of a camel's hair brush. The powdered material is packed down well with a flattened stirring rod. Then 10-15 cc. of the hot oil is poured over the sample, which is again packed down with a stirring rod to a level surface. The stirring rod is washed off and the crucible filled with the same hot oil to within ¼-inch of the top. The crucible is then placed under the cork stopper carrying the T tube through which the hot carbon dioxide is flowing.

The suction and the hot gas flow are continued one hour after the oil level has reached the surface of the cake. Then the crucible is removed, the excess of oil wiped off from the outside and from the inside surface above the cake, and the crucible cooled in a desiccator. The contents of the crucible are transferred into a tared dish; for this purpose, a light puff of air applied from any convenient source is very useful. The muslin disk is removed and any particles of cake adhering to the sides of the crucible or to the muslin are easily scraped off. The cake is weighed to ±.001 gram.

Bleaching carbons are likely to show a tendency to pass through the muslin disk. When this happens, the first portion of the filtrate is collected in a test tube of suitable size suspended inside the suction flask. The oil thus collected is returned to the crucible until it is no longer cloudy.

The moisture in the original sample of earth or other bleaching material is determined by drying 5 grams to constant weight at 105-10°C.

Calculation

$$2.000 - \frac{2\ (\%\ \text{Moisture})}{100} = \text{Wt. dry sample.}$$

$$\frac{100\ (\text{Wt. cake} - \text{Wt. dry sample})}{\text{Wt. dry sample}} = \text{Lbs. oil per 100 lbs. dry sample}$$

$$\frac{100\ (\text{Wt. cake} - \text{Wt. dry sample})}{\text{Wt. cake}} = \%\ \text{Oil in cake (dry basis)}$$

Duplicate determinations should check within one pound oil per 100 pounds dry sample. Calculation of the results may be facilitated by the use of a chart constructed as shown in Figure 2.

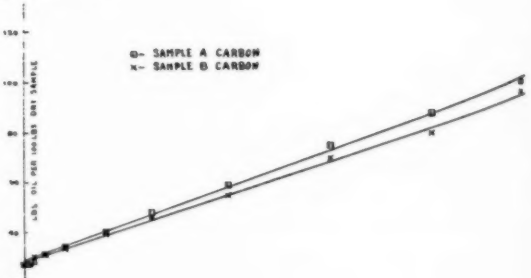


FIG. 3
Oil retention of mixtures of English earth with carbon.

Discussion

TYPICAL results from the above method are shown in Figure 3, which incidentally brings out the fact that the oil retention of earth-carbon mixtures has been found to be a straight line function.

It is not claimed that the method has been reduced to its simplest possible terms. We undertook to develop a procedure for determining in the laboratory reproducible values for oil retention which would fall within the range normally observed in plant practice for oil

(*Turn to Page* 43)

Procter and Gamble Foster Practical Research

Complete Laboratory and Experimental Bakery Maintained for Study of Shortening Applications

The Procter & Gamble bakery research laboratory

A NUMBER of years ago The Procter & Gamble Co. entered the edible fat industry. It soon became apparent to them that a thorough knowledge of the problems confronting the baker was essential to the success of this business. It was evident that only an understanding of the principles of baking could enable them to produce shortenings so designed as to meet the exacting demands of the trade.

The department began in a small way with one chemist assigned to it and one practical baker. In spite of the fact that these two experimenters had the assistance and cooperation of the entire Chemical and Engineering Divisions of the Company, it was soon quite evident that the department was entirely too small to obtain the best results in all of the fields of endeavor which seemed advisable. Today there is a group of practical bakers, and several chemists who devote their entire time to bakery projects. Other members of the Chemical Division, including the general laboratory staff, lend considerable assistance in carrying on the work of the department. Members of the Engineering Staff are frequently consulted and the Sales Research and Advertising Departments contribute their share.

Some of the practical bakers are devoting almost their entire time to educational work in bakeshops all over the country. They are assigned to work with certain salesmen so that they cover their districts at regular intervals and give service to a baker when trouble enters his shop. They also give formulas to the baker and instruct him in modern shop practice. Other bakers spend most of their time in the experimental bakery carrying on research problems. In this work they are under the guidance of the Chemical Staff, who assist them in laying out their research program, in the examination of the baked goods produced, and in drawing up their data and reports. In addition to the many calls which were made by the traveling bakers during the year 1928, hundreds of letters were received from bakers. These letters contained requests of all kinds for information, service and formulas. The bakery is visited from time to time by scores of practical bakers, allied chemists, and others interested in the baking industry. Many of these visitors spend from one to ten days in the experimental bakery, during which time

(*Turn to Page* 43)

A Test for Neutral Oil in Soap or Fatty Acids

By John E. Rutzler, Jr.
Pilot Laboratory, Inc.

THE present methods[1] for the determination of neutral oil in soap or fatty acids are time consuming and tedious, although the results are quantitative. This fact provides a utility for a rapid quantitative method for the estimation of unsaponified oil in soap or fatty acids.

Lewkowitsch states[2], "In order to test for unsaponified fat (in fatty acids) 3 cc. are dissolved in 15 cc. of 95% by volume alcohol, and 15 cc. aqueous ammonium hydroxide is added." Geitel says[3] that under these conditions turbidity will appear if there is unsaponified oil present, and that if the amount of unsaponifiable matter present is large, the results of the test are not reliable.

This test has been examined critically by the author. A sample of coconut oil acids was prepared by saponification of the oil, and subsequent acidification of the soap. The acids were then neutralized in the presence of excess alkali, boiled, and the acids re-liberated, using hydrochloric acid. These acids contained about 0.35% unsaponifiable matter. Several experiments were made using double the proportions suggested by Lewkowitsch. The net result was that upon making mixtures of acids containing known amounts of neutral coconut oil and proceeding to test as above, the test was found to be positive down to 0.078% neutral oil present. It was also found that if only half of the amount of alcohol specified is used, the oil particles do not become peptized, and the test is negative. The emulsions formed were not at all stable, because the ammonium hydroxide saponified the suspended oil particles within an hour or so.

Due to the fact that the blank experiment (no oil present) on the above acids showed a very slight haze, another sample of acids was prepared in a slightly different manner. The oil was saponified in the presence of approximately 15% excess alkali, a mixture of NaOH, and KOH being used. After standing in a warm place for five days, the soap was decomposed and the acids liberated by prolonged agitation with dilute sulfuric acid. The acid liquor was then changed, and the fatty acids agitated for four hours with a concentrated solution of sodium bisulfite in order to lower the amount of unsaponifiable matter present. They were then washed three times with fresh water, the wash water being completely removed each time. The acids were dried by heating to 80° C. under vacuum of approximately 700 mm. The unsaponifiable matter in these acids was about 0.10% after this treatment.

When the above-described acids were tested by the Lewkowitsch method, using double the quantities prescribed, not even a slight haze was noticed.

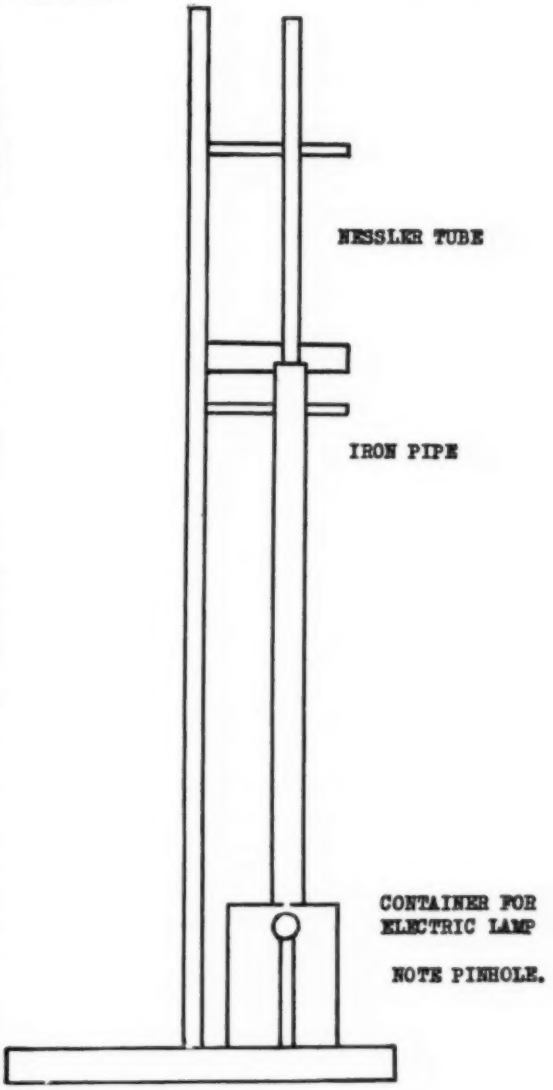


Fig. 1.
Emulsometer

It was found that with these acids no amount of oil less than 1% could be detected using the Lewkowitsch test. It therefore became necessary to sensitize the test. This was done by

mixing known amounts of technical white mineral oil with the fatty acids. Four preliminary experiments were made with the following results: one drop to technical white oil mixed with the fatty acids gave no turbidity; when two drops were used a slight haze was evident; when two drops of the mineral oil and one drop of neutral coconut oil were mixed with the acids a slight turbidity was noticed; finally, when four drops of the mineral oil were mixed with the acids great turbidity was evident.

The weight of 6cc. of the acids was accurately determined to be 5.376 grams. The weight of one drop of the oil from which the acids were made was found to be 0.0124 gram. The oil was dropped from a pipette, the opening of which was very small. Next, the weight of one drop of technical white oil as dropped from another pipette was found to be 0.0175 gram. These weights were determined at 26 degrees centigrade, plus or minus two degrees. All subsequent work was performed at this temperature.

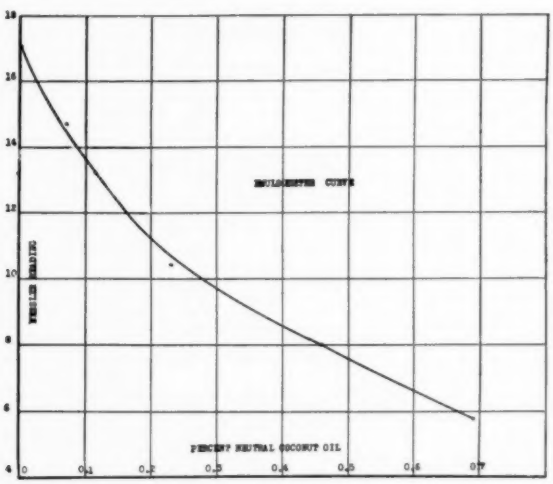


Fig. 2
Emulsometer Curve

The next step was to make use of the emulsometer shown in figure 1. The emulsometer consists simply of an electric light (100 watts), shielded by a round container with a pinhole in the top,. From the top of the container a pipe of small diameter extends upward. On the top of the pipe a Nessler tube is supported. Therefore the distance from the light to the Nessler tube is fixed. This distance was 93.2 centimeters in the case of the instrument used for the work here described. The purpose of the pipe is to obviate light reflection and disturbances so that the instrument may be used in daylight. Three preliminary experiments were made, using the emulsometer. Three drops of technical white oil were mixed with 6cc. of the fatty acids, and one drop of neutral coconut oil added. This solution was neutralized with concentrated ammonium hydroxide, as prescribed by Lewkowitsch. The resulting emulsion was slowly poured into the Nessler tube until the light from the electric lamp was no longer visible. So much emulsion was necessary that the graduated capacity of the Nessler tube was exceeded. The test was further sensitized by using four drops of mineral oil, following the above procedure. The height of the emulsion in the Nessler tube at the point of light extinction was found to be 25.5 units. The procedure was repeated using one half of the amount of neutral coconut oil. It being impracticable to try to measure out a half of a drop of the oil, one drop was mixed with 12 cc., of the acids and to 6 cc. of the solution four drops of technical white oil were added. The solution was then neutralized as before. This time the emulsometer reading was 25.0 units. This data is just the reverse of what it should be. The difficulty was apparent, however, for on the same emulsion the height in the Nessler tube necessary to cause extinction of the beam of light became progressively less as its age increased. Whether this phenomenon is the result of partial coalescence due to saponification of the oil, or is due to a fairly large time factor in the peptization of the oil particles, is not immediately apparent. The phenomenon, however, does necessitate making the emulsometer readings at a given time after the formation of the emulsion.

The difficulties having been ironed out, the test was reduced to a quantitative basis by the following procedure. Six cc. of the fatty acids above described were measured very carefully in a 10cc. graduate. Four drops of technical white oil were added to the acids, using a standard pipette. Again, using a standard pipette, the desired number of drops of neutral coconut oil were added. The graduate was then shaken as thoroughly as possible without covering the top. This solution was carefully poured into a 100 cc. graduate. After draining for a short time the 10 cc. graduate was thoroughly washed with 95% ethyl alcohol, the washings being put into the 100 cc. graduate, until the total volume in the larger graduate was 36 cc. The 100 cc. graduate was then rotated rapidly to secure a uniform solution. To this solution 30 cc. of concentrated ammonium hydroxide was added, the time at which the addition was started being carefully noted. The emulsion was then stirred with a clean glass stirring rod until the system began to foam. The system was allowed to stay in the graduate for three

(*Turn to Page 29*)

Condensed Financial Statement of American Oil Chemists Society

As of April 30, 1929

Receipts and Disbursements:

Cash on hand May 1, 1928	$1,571.06
Received 1928-1929 from:	
Dues and Subscriptions to *Oil & Fat Industries*	1,700.00
Referee Certificate Fees	205.00
Color Glass Standardization	1,111.53
Fullers' Earth and Apparatus Sales	544.79
Smalley Foundation	1,247.75
Research Contribution from Interstate Cottonseed Crushers' Association	1,000.00
Sale of Standard Analytical Methods	230.44
Convention Registrations	352.50
Total	$7,963.07
Paid out 1928-1929 for:	
Secretary's Office and publication Expense	1,123.46
Advertising	195.00
Referee Board Expense	36.78
Fullers'Earth and Apparatus Sales Expense	337.47
Color Glass Standardization Expense	1,192.95
Smalley Foundation Expense	1,111.23
Convention Expense	318.70
Standard Analytical Methods (Printing, postage, etc.)	852.38
Printing Membership Rolls	29.25
Total	$5,197.22
Balance in Cash Account Apriil 30, 1929	$2,765.85

Balance Sheet, May, 1, 1929

Assets:	
Cash	$2,765.85
Securities	1,900.00
Accounts Receivable	206.45
TOTAL	$4,872.30
Liabilities:	
Accounts Payable (Total)	$7.30

A record for Norwegian production of whale oil was set in 1928, when 801,500 bbls. of oil, worth $18,149,200, were produced, as compared with 704,000 bbls., valued at $16,014,000, produced in 1927, the largest previous total on record. Difficulty is being experienced in marketing this amount at previous prices, a price of only $119.50 per ton having been offered by one buyer on 250,000 bbls. This was not accepted. Buying is well organized under the control of the European Margarine Trust, and the sellers, previously able to operate independently, have now found it advisable to organize as the Norwegian Whaling Association. Contract prices this season have averaged $145.80 per ton.

The research laboratories of the National Oil Products Company, Harrison, New Jersey, have perfected a new process which has made it possible for the first time to subject many oils, fats and waxes to a process which renders them directly emulsifiable in water without the use of any emulsifying agent, such as alkalis, acids or soaps. Oils and fats treated by this new process are said to retain practically all of the natural characteristics of the original material; that is, they undergo no severe chemical change, and their physical appearance is fundamentally the same after treatment as before. The process has been applied to olive oil, castor oil, coconut oil, neatsfoot oil, and many other oils, fats and waxes.

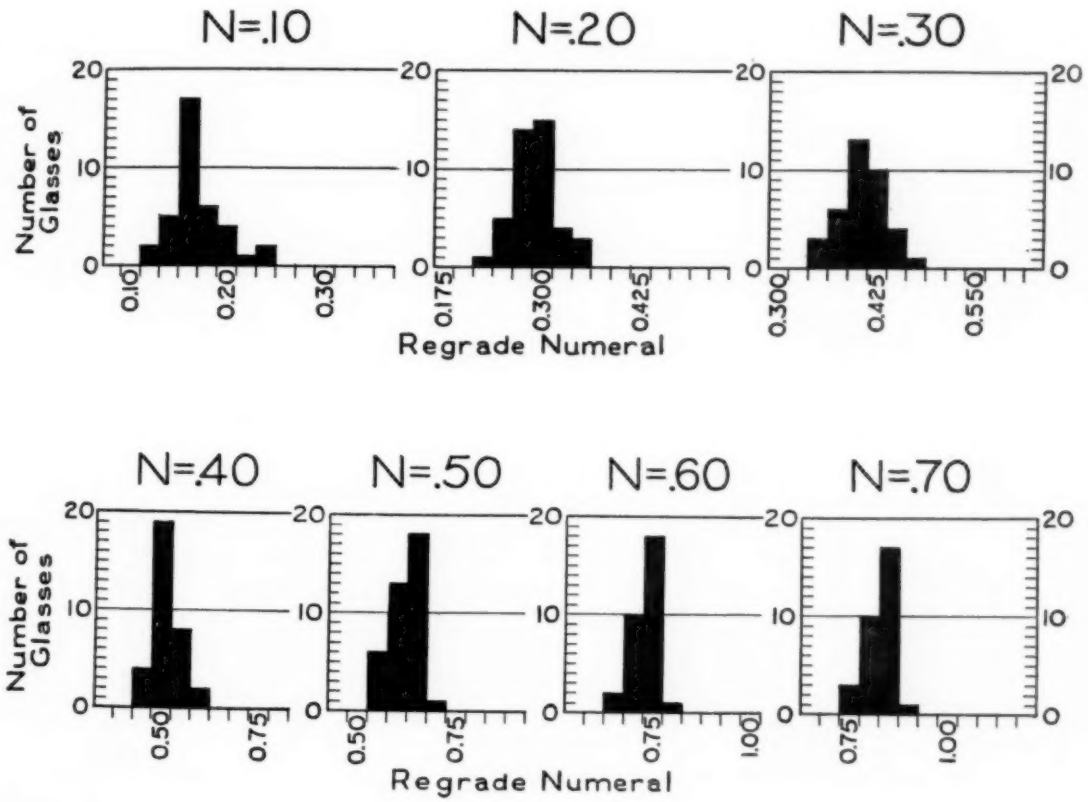
Results in Regrading Lovibond Red Glasses

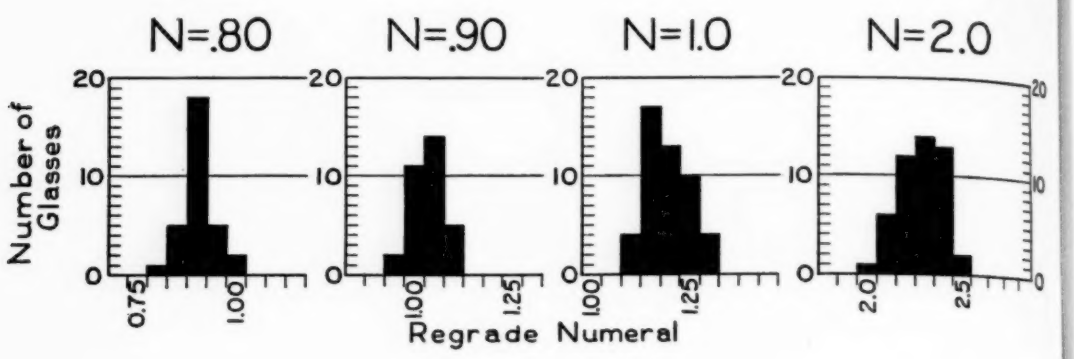
By Irwin G. Priest

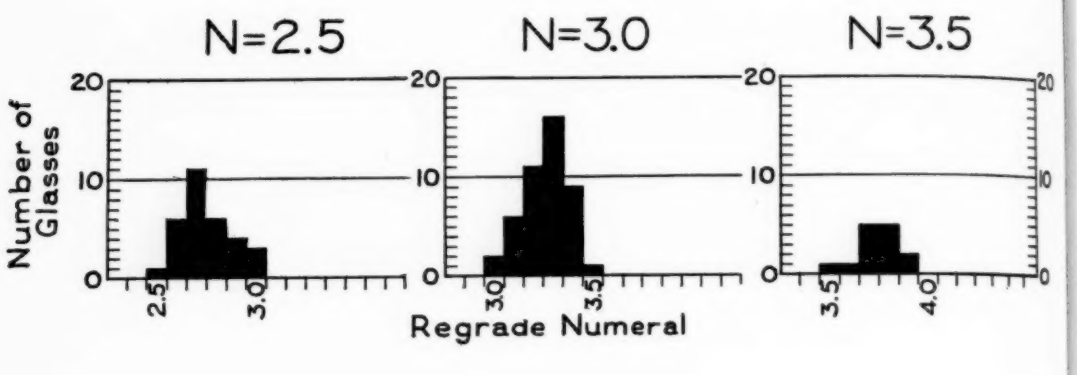
Physicist, Bureau of Standards, U. S. Department of Commerce

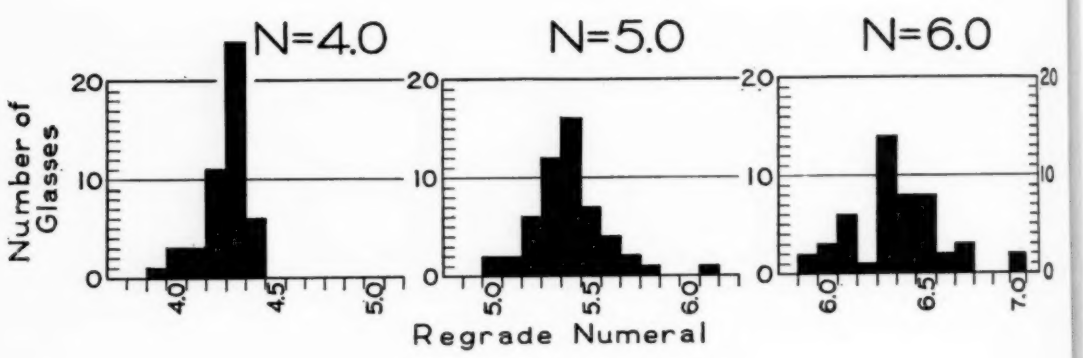
HEREWITH are given eight diagrams which summarize in a rather striking way the results obtained by Miss Walker in regrading 1000 red glasses. These figures are intended to show the spread of regrade values (the values we have certified) for glasses having a given grade (N) as submitted. That is, they show the actual discrepancies among glasses which had nominally the same grade when submitted to us. Each of the small diagrams indicates the distribution of glasses according to regrade numeral for a given nominal grade, N, as submitted. These diagrams have been made to illustrate a report which Miss Walker is now preparing for publication. I believe they will be found self-explanatory, and will be of some interest to the American Oil Chemists Society.

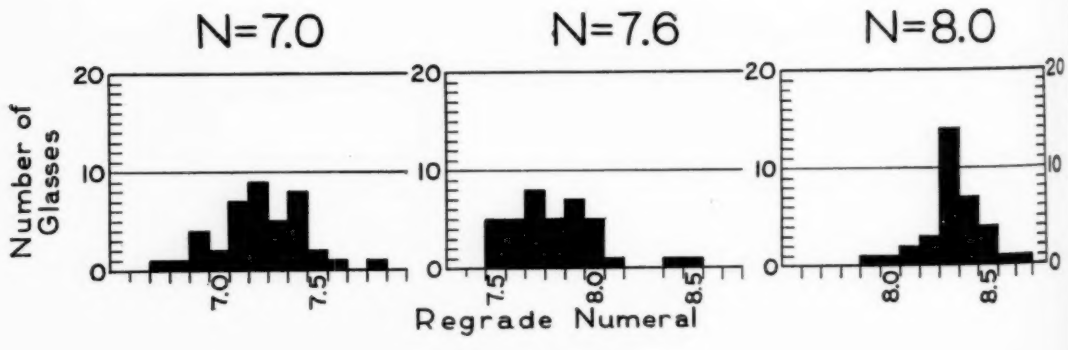
We have designed and constructed an instrument intended to make the use of Lovibond glasses more convenient and reliable in color-grading oils. I would be glad to have any interested members of the Society call here and examine this instrument at their convenience.

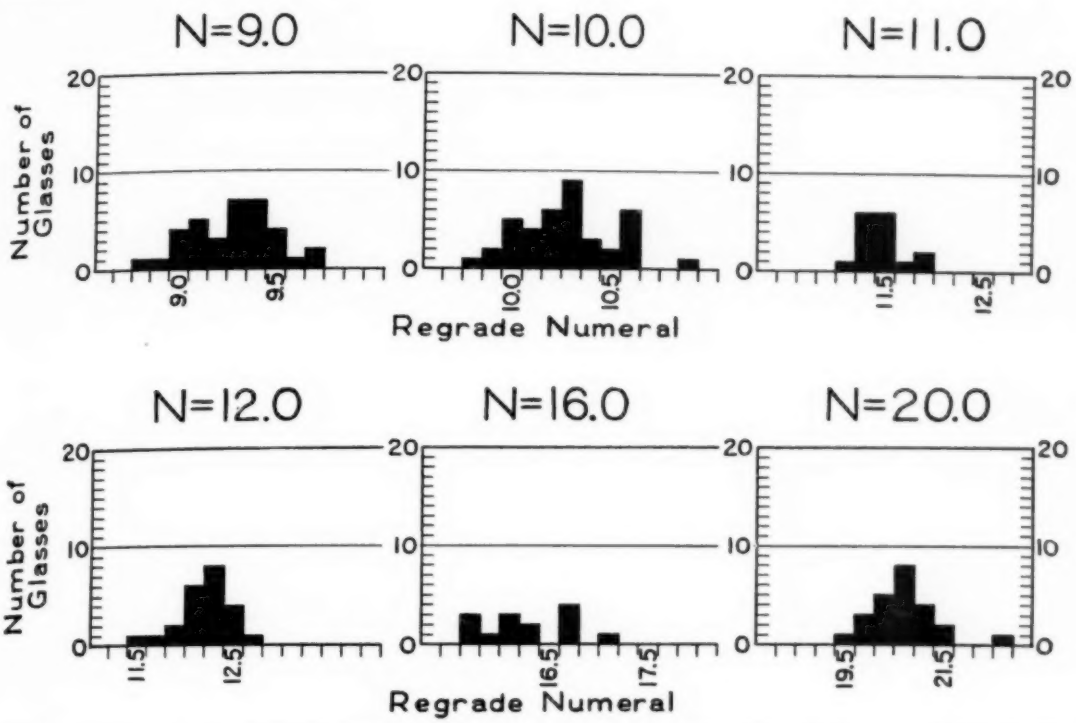



N=.80
N=.90
N=1.0
N=2.0
Number of Glasses
0
10
20
0.75
1.00
1.25
2.0
2.5
Regrade Numeral


N=2.5
N=3.0
N=3.5
Number of Glasses
0
10
20
2.5
3.0
3.5
4.0
Regrade Numeral


N=4.0
N=5.0
N=6.0
Number of Glasses
0
10
20
4.0
4.5
5.0
5.5
6.0
6.5
7.0
Regrade Numeral


N=7.0
N=7.6
N=8.0
Number of Glasses
0
10
20
7.0
7.5
8.0
8.5
Regrade Numeral



A Test for Neutral Oil

(*From Page* 24)

minutes. Then it was slowly poured into the Nessler tube of the emulsometer until the yellow color of the light turned red, and was finally extinguished. The extinction point should be found before a total time of 4½ minutes has elapsed from the time of the first addition of the ammonium hydroxide.

The above experiment was repeated, using different quantities of oil. The following data was secured.

Drops mineral oil	Drops coconut oil	W't. oil gms.	% oil	W't. acids gms.	W't. acids taken gms.	Nessler reading
4	0	0	0	5.376	5.376	17.0
4	1	0.0124	0.076	16.128	5.376	14.75
4	1	0.0124	0.115	10.752	5.376	13.25
4	1	0.0124	0.23	5.376	5.376	10.40
4	2	0.0248	0.46	5.376	5.376	8.0
4	3	0.0372	0.69	5.375	5.376	5.80

Plotting Nessler readings as ordinates, and percent neutral oil as abscissae, the curve of figure 2 follows. This curve shows that as the percent of neutral coconut oil in the acids increases, the turbidity of the emulsion of oil in water increases and offers more resistance to the passage of the red component of the Tyndall beam.

In order to determine the percent of neutral oil in coconut oil soap, or fatty acids, it is only necessary to follow the test as described above, omitting the addition of the coconut oil. Of course, if the material to be tested is soap, it must first be acidified by any suitable method. After securing the acids, in any case, they should be subjected to a treatment with sodium bisulfite. If it is not desired to do this, and the unsaponifiable matter contained in the oil and acids is fairly constant in amount, the emulsometer curve can be re-made for any type of oil, by experiments similar to those described. From the Nessler reading, by reference to the curve, the percent of neutral oil present can be read directly.

(1) J. I. E. C., **18**, 1353 (1926). Thomssen: "Soap Making Manual," P. 148.

(2) Lewkowitsch: "Chem. Tech. and Anal. of Oils, Fats, and Waxes, 1, 112 (1921).

(3) Ibid.

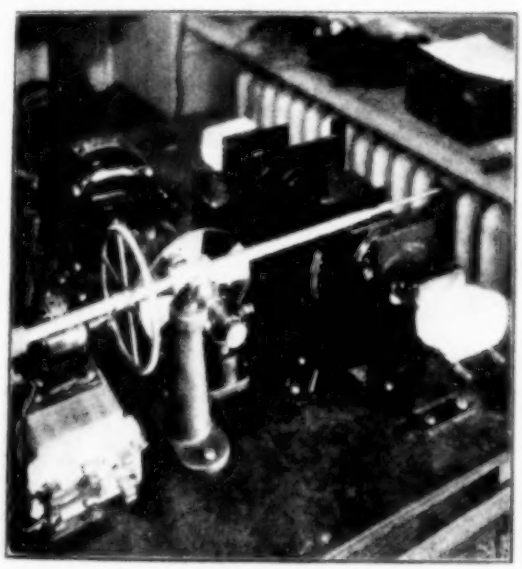
Re-esterification and condensation, as well as polymerization, are factors in the coagulation of chinawood oil. The various colloidal phases corresponding to these factors have different physical characteristics and solubilities. Reagents which are added to hasten or prevent coagulation of wood oil act by depolymerizing, by esterifying or by the formation of mixed glycerides. *Chem. Unschau Fette, Oele, Wachse Harze* 36; 35-8 (1929).

The Hardy Recording Spectrophotometer

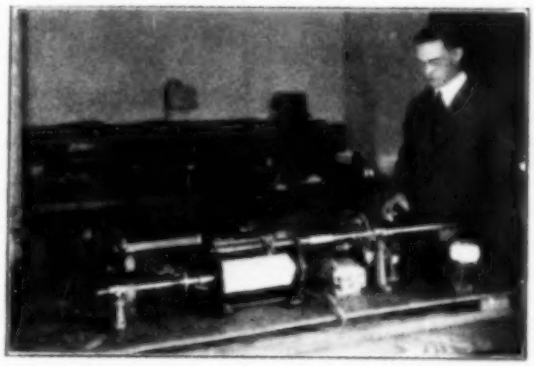
New Electrically Controlled Instrument Eliminates Visual Errors in Colorimetry

A MACHINE, known as the recording spectrophotometer, is now being developed for practical commercial applications at the research laboratories of the General Electric Company at Schenectady, N. Y. The instrument is primarily an analyzer of color for use in measuring and matching colors without the human eye playing any part. It makes a definite and permanent record in the form of a curve of every color and shade and does not depend on standard colors which might not retain their original shade over a period of time because of fading or some other deterioration. The idea of the spectrophotometer was conceived and developed by Professor Arthur C. Hardy of the Department of Physics of the Massachusetts Institute of Technology, who is also connected with the research staff of the General Electric Company.

The instrument measures the color by reflected light. A sample of the desired color is placed before a window in the machine and



Photograph of the spectrophotometer showing color specimen, magnesium carbonate standard, light source and analyzing disk. Photos by General Electric Co. as published in Executives' Service Bulletin.



Dr. Arthur C. Hardy, originator of the spectrophotometer, in the laboratory of the General Electric Co.

the power is turned on. The registration of the color value curve requires only 30 seconds. The curve as drawn by the instrument is taken out and compared with the curve of the color which is being matched or with the one which seems most like the one in question. Where the curves agree, the colors must be the same irrespective of their appearance to the human eye or of lighting conditions. If the curves do not coincide, then, the elements of the colors are different no matter how closely they may appear to match.

The spectrophotometer consists of an apparatus for breaking up the light reflected from a sample of color and measuring the intensity of each portion of the spectrum as compared with a standard. The record is made in the form of a continuous line on a chart. The sample is compared with carbonate of magnesia which is a very *white* white. The sample of color and standard are illuminated by a special ribbon-filament incandescent lamp. Shutters admit alternate beams from the sample and standard to the slit of a spectrograph. Another movable slit is automatically adjusted so that each portion of the spectrum, or color band of light, is admitted in turn to a photoelectric, or light sensitive, tube. As the light of single wave-length is reflected alternately from the sample and standard, and as the intensities differ, a pulsating current is set up in the photoelectric tube. This pulsating current is fed through a vacuum tube amplifier that in-

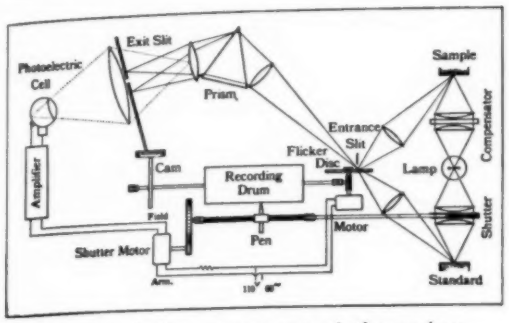


Diagram of the arrangement of the various parts of the Hardy Spectrophotometer

creases the power ten billion times, and is then fed to a motor which adjusts the shutter between the light source and the standard to that position where the current pulsation ceases. The opening of the shutter, then, is a measure of the intensity of a particular spectrum line in the specimen color. The device automatically compares minute portions of the specimen spectrum with the standard, and records the analysis on a revolving drum.

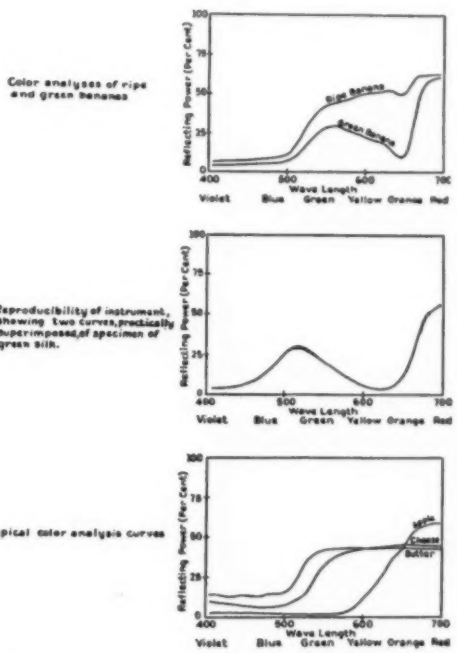
The importance of the new color analyzer lies in its value to industry, in nearly every branch of which control of the color of products is necessary. Accurate measurement of colors is the first concern of manufacturers of fabrics, particularly in the delicate shades which often deceive the eye. Color control and accuracy are, as is well known, also of basic importance in the making of printing inks, paints, dyes and paper. There is scarcely an industry without a color problem.

Lubricating oils are graded almost entirely on the basis of color. In the same way, small differences in color mean thousands of dollars in the sales of vegetable oils. It is quite possible that this machine may be developed to such a point that it will greatly simplify the color grading of oils.

The desirability of a product of uniform color applies equally well in manufacturing such things as soap, lard, flour, butter, oleomargarine, cheese, sugar, syrup, chocolate, glass, automobiles, tile, brick, roofing materials, carpets, rope, hardware, paper, leather, cement, linoleum, textiles, cosmetics, and many other products.

One of the most important fields of usefulness for the recording spectrophotometer is expected to be in the cataloging of the curves of different dyes, so that new colors with pre- it is expected to be of service; but a sufficient determined characteristics can be obtained at any time by the proper mixture of standard dyes already at hand.

Since the instrument has been developed, there has not been sufficent time to test its applicability to all of the industries in which



Color analyses of ripe and green bananas, showing more orange and yellow in the ripe fruit. Showing how two samples of one color give superimposed curves. Typical color analyses of apple, cheese, butter.

number of tests have been made to indicate that the instrument will be of use in many different kinds of work.

Research is being carried on at the laboratories of the General Electric Company. Neither the originator of the instrument nor the company is ready as yet for commercial use of the machine on a broad scale. Its commercial application has innumerable possibilities which have been appreciated by various industries. Inquiries from every conceivable source have actually swamped the General Electric Company so great is the interest in the device. In the oil industries, its possible uses are quite obvious in color matching and color measuring. As further data regarding the instrument becomes available, particularly regarding its application in oils and fats, Dr. Hardy has agreed to see to it that the facts shall be furnished promptly to the readers of *Oil & Fat Industries.*

Fat and Oil Data for Second Quarter 1929

Production, Consumption, Exports and Imports with Factory and Warehouse Stocks June 30, 1929

THE Department of Commerce announces that the factory production of fats and oils (exclusive of refined oil and derivatives) during the three-month period ended June 30, 1929, was as follows: Vegetable oils, 476,615,560 pounds; fish oils, 10,177,682 pounds; animal fats, 563,267,418 pounds; and greases, 100,870,792 pounds; a total of 1,150,931,452 pounds. Of the several kinds of fats and oils covered by this inquiry, the greatest production, 444,659,527 pounds appears for lard. Next in order is linseed oil with 184,087,611 pounds; cottonseed oil with 141,714,089 pounds; tallow with 117,270,619 pounds; coconut oil with 92,992,798 pounds, and corn oil with 29,189,346 pounds.

The production of refined oils during the period was as follows: Cottonseed, 202,850,409 pounds, coconut, 73,704,084 pounds; peanut, 2,321,416 pounds; corn, 27,823,340 pounds; soya-bean, 2,241,698 pounds; and palm-kernel, 5,719,315 pounds. The quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

The data for the factory production, factory consumption, imports, exports and factory and warehouse stocks of fats and oils and for the raw materials used in the production of vegetable oils for the three-month period appear in the following statements:

(In some cases, where products were made by a continuous process, the intermediate products were not reported.)

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS

KIND	Factory operations for the quarter ended June 30, 1929		Factory and Ware'se stocks
	Production (pounds)	Consumption (pounds)	June 30, 1929 (pounds)
VEGETABLE OILS: [1]			
Cottonseed, crude	141,714,089	222,771,390	30,078,843
Cottonseed, refined	202,850,409	303,687,628	431,100,474
Peanut, virgin and crude	2,331,359	2,980,329	2,032,594
Peanut, refined	2,321,416	2,272,965	1,746,927
Coconut, or copra, crude	92,992,798	154,337,303	161,103,376
Coconut, or copra, refined	73,704,084	71,436,131	21,861,632
Corn, crude	29,189,346	34,193,296	11,387,711
Corn, refined	27,823,340	5,818,089	11,791,238
Soya-bean, crude	1,276,875	5,069,582	9,782,329
Soya-bean, refined	2,241,698	986,140	1,993,449
Olive, edible	2,707	521,810	6,320,832
Olive, inedible	—	1,366,291	1,595,342
Sulphur oil, or olive foots	—	11,022,411	10,939,777
Palm-kernel, crude	—	17,288,839	34,063,916
Palm-kernel, refined	5,719,315	3,793,920	1,913,398
Rapeseed	—	3,329,590	6,124,729
Linseed	184,087,611	138,210,044	122,937,387
Chinese wood or tung	—	26,220,015	18,421,260
Chinese vegetable tallow	—	2,480,476	5,475,454
Castor	20,015,513	7,910,071	10,524,442
Palm	—	48,745,548	48,365,771
All other	5,005,262	3,435,818	12,547,614
FISH OILS: [1]			
Cod and cod-liver	201,000	3,633,144	7,093,054
Menhaden	1,735,570	5,919,298	5,275,229
Whale	4,235,250	18,656,144	54,538,169
Herring, including sardine	3,580,612	16,031,822	18,608,456
Sperm	96,750	285,968	2,299,411
All other, (including marine animal)	328,500	890,509	2,247,497
ANIMAL FATS:			
Lard, neutral	11,254,139	5,384,106	8,674,767
Lard, other edible	433,405,388	4,310,070	146,528,768
Tallow, edible	11,050,308	7,283,399	3,314,116
Tallow, inedible	106,220,311	141,666,016	89,728,350
Neat's-foot oil	1,337,272	1,476,689	1,511,791

[1] The data of oils produced, consumed, and on hand by fish oil producers and fish canners were collected by the Bureau of Fisheries.

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS (Continued)

	Factory operations for the quarter ended June 30, 1929		Factory and Ware'se stocks June 30, 1929
	Production (pounds	Consumption (pounds)	(pounds)
GREASES:			
White	18,777,130	8,695,589	11,245,208
Yellow	21,543,219	14,573,127	10,555,586
Brown	11,325,522	7,226,304	5,940,352
Bone	6,539,141	264,414	2,416,254
Tankage	13,973,663	388,668	3,494,560
Garbage or house	23,851,679	15,418,828	12,325,867
Wool	2,173,433	1,569,417	3,450,825
Recovered	610,323	474,389	567,393
All other	2,076,682	1,216,856	4,525,856
OTHER PRODUCTS:			
Lard compounds and other lard substitutes	297,501,501	51,808	28,941,275
Hydrogenated oils	159,074,510	140,236,899	13,703,902
Stearin, vegetable	4,464,775	4,952,780	2,379,773
Stearin, animal, edible	13,817,590	12,071,940	5,929,462
Stearin, animal, inedible	4,837,050	4,908,702	4,348,315
Oleo oil	31,662,110	11,183,533	15,702,318
Lard oil	7,630,121	4,807,407	4,002,337
Tallow oil	2,963,017	2,638,666	2,050,129
Fatty acids	33,977,394	37,284,045	5,430,790
Fatty acids, distilled	8,744,003	5,244,475	2,337,695
Red oil	14,360,292	8,471,452	8,115,206
Stearic acid	10,152,265	2,212,048	4,417,191
Glycerin, crude 80% basis	33,177,326	37,579,717	19,415,796
Glycerin, dynamite	15,319,014	8,270,831	15,855,863
Glycerin, chemically pure	15,411,095	2,230,499	9,242,952
Cottonseed foots, 50% basis	38,024,451	44,731,804	28,928,418
Cottonseed foots, distilled	28,021,483	25,968,391	6,574,618
Other vegetable oil foots	19,068,995	16,112,994	3,339,121
Other vegetable oil foots, distilled	215,007	845,573	558,277
Acidulated soap stock	17,454,817	14,966,578	16,576,575
Miscellaneous soap stock	563,270	707,602	504,400

RAW MATERIALS USED IN THE MANUFACTURE OF VEGETABLE OILS

KIND	Tons of 2000 pounds Consumed April 1 to June 30	On hand June 30	KIND	Tons of 2000 pounds Consumed April 1 to June 30	On hand June 30
Cottonseed	411,941	63,401	Flaxseed	274,838	100,617
Peanuts, hulled	3,098	470	Castor beans	21,786	7,651
Peanuts, in the hull	549	200	Mustard seed	235	1,688
Copra	73,519	42,567	Soya-beans	4,833	58
Coconuts and skins	378	157	Olives	12	—
Corn germs	49,161	246	Other kinds	6,122	4,242

IMPORTS OF OIL SEEDS, QUARTER ENDED JUNE 30, 1929

KIND	Tons	KIND	Tons
Castor beans	21,237	Poppy seed	1,141
Copra	88,707	Perilla and sesame seed	3,969
Flaxseed	246,263	Other oil seeds	4,360

IMPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED JUNE 30, 1929

KIND	Pounds	KIND	Pounds
Animal oils & fats, edible	562,235	Palm-kernel oil	33,431,753
Whale oil	49,381,373	Sesame oil	11,680,866
Cod oil	4,209,247	Vegetable tallow	8,603,258
Cod-liver oil	5,721,870	Vegetable wax	1,310,567
Other fish oils	6,103,095	Carnauba wax	2,035,212
Tallow	6,802,117	Peanut oil	1,724,249
Wool grease	3,395,232	Rape (colza) oil	6,891,712
Grease and oils, n.e.s. (value)	$463,792	Linseed oil	6,415,055
Olive oil, edible	31,108,230	Soya-bean oil	5,589,556
Tung oils	27,262,165	Perilla oil	2,741,700
Coconut oil	112,150,062	Other expressed oils	8,038,597
Sulphur oil or olive foots	21,106,756	Glycerin, crude	3,819,758
Other olive oil, edible	2,805,141	Glycerin, refined	2,299,063
Palm oil	78,275,359		

(*Turn to Page* 43)

ABSTRACTS

David Wesson, *Abstract Editor*

In the determination of saponification numbers of fats and oils, addition of a small quantity of sodium thiosulfate (5 grams per liter) to the alcoholic caustic potash reagent is said to be effective in preventing coloration of the solution. When the clear supernatant liquid is used for the determination of saponification values, the results obtained with this reagent agree with those obtained with the official reagent. At attempt to find a general inhibitor for color development during the saponification process has been unsuccessful.—*J. Assoc. Off. Agric. Chem.*, 12, 248—50 (1929).

Recent investigations of the composition of the mixed glycerides in cacao butter have resulted in the following general estimate of its composition: saturated glycerides 2.5%, (mainly mixed palmitostearins), monooleodisaturated glycerides 77%, dioleo-monosaturated glycerides, 16%, and triolein 4%. *J. Soc. Chem. Ind.* 48, 41-6T (1929).

Products suitable for use in the textile and leather industries as wetting, cleaning and emulsifying agents, and which appear to be true sulfonic acids, are formed by treating aliphatic acids of high molecular weight such as oleic acid or linoleic acid with sulfuric acid in the presence of organic acid anhydrides or chlorides such as acetic anhydride or acetyl chloride.—Brit Pat. No. 298,559.

In the determination of iodine values, the results obtained by the method of Hanus with a solution of bromiodine in acetic acid are said to be lower than the values obtained by the Hübl method. If the acetic acid is not anhydrous, the strength of the solution decreases on standing and the iodine is not in excess sufficient to saturate the second double bonds, within the conditions of the test. Therefore the same solution may give lower values with the same oil some weeks later. The method of Wijs with chloriodine is more reliable.—*Bull. sci. pharmacol.* 35,692-8 (1928).

Masao Nonaka, a Japanese physical chemist, has conducted some interesting experiments which tend to prove that the washing property of soap, which is caused by adsorption, varies with the nature of the material washed. Nonaka's studies involved observations on the adsorption of soap at the contact surface between benzene or toluene and an aqueous solution of sodium oleate or palmitate. He found that the adsorbed quantity is larger than the value calculated on the monomolecular layer theory, which led him to conclude that the adsorbed layer is monomicellar rather than monomolecular, and that it consists of neutral soap, the free fatty acids being dissolved in the adsorbents. When air was used as an adsorbent instead of benzene or toluene, the adsorbed layer consisted of the neutral soap plus the free fatty acids. *J. Soc. Chem. Ind. (Japan)*; *Suppl. Binding* 31, 73 (1928).

From lathering experiments on several commercial soaps, in which the soap solution below the lather was made up again to the original volume, reshaken and the operation repeated until little or no lather could be produced, it was concluded that 0.15% soap is the optimum concentration for best lathering and that the "active" soap can be removed from solution by repeated shaking as above.—*Z. phys. chem. Seifenforsch* 2, 18-22 (1929).

The American Chemical Industry, Published by United States Department of Commerce as No. 78 of the Trade Promotion Series. 114 pages. Paper binding. Size, 6 by 9. This volume traces the rapid growth of the American chemical industry in modern times. Charts and figures show how America has become an exporter rather than an importer of chemicals, give information about our largest customers, and show where potential markets for American chemicals are. Copies may be obtained from any District Office of the Bureau of Foreign and Domestic Commerce or from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Notes of the Industry

Container Standardization Progresses

Continuous progress is being made in the standardization of steel barrels and drums, according to Ray M. Hudson, Assistant Director of the Bureau of Standards, in charge of the Commercial Standards Group. In 1926, a total of 89 per cent of the steel barrels and drums produced by the acceptors of simplified practice recommendation No. 20—Steel Barrels and Drums—were in accordance with the simplified list of sizes. This was a gain over 1925, when the percentage totaled only 86 per cent. The movement toward standardization started in 1924 when the steel barrel and drum industry came to the Bureau of Standards for assistance. At that time 42 sizes were eliminated, leaving 24 standard sizes. Since that time one more size has been accepted as standard. Some manufacturers still find it necessary to make special sizes, but the degree of adherence to the recommendations of the Bureau is quite high and on the upward trend.

Form United Africa Palm Oil Co.

United Africa Co., Inc., formed by the consolidation of Niger Co. and African & Eastern Trading Co., started business on September 1, 1929, taking over the functions of the two named companies. All contracts made prior to that date will be fulfilled by Niger Co. and African & Eastern Trading Co., and after the expiration of the contracts those companies will become inactive. The offices of the United Africa Co., will be located at 205-17 East 42nd St., New York.

Advertising Censors Appointed

A special board of investigation has been appointed by Federal Trade Commission to inquire into seemingly false and misleading statements used in advertising, and to report its findings to the Commission. This marks another step in the government policy of cooperating with the trade, and shows a tendency toward arbitration rather than abrupt legal action. Advertisers will be encouraged to solve their own problems and exert action on violators from within. In case violations do occur, the members of the special board will take up the points in question with the offenders, and seek to reach an amicable settlement without having recourse to court action.

Deupree New P. & G. President

R. H. Deupree, for some years vice-president and general manager of the Procter & Gamble Co. has been made president of the company to succeed Col. William Cooper Procter who becomes Chairman of the Board, a new position recently authorized by the stockholders. At the same time as the recent five for one stock split up was made, the internal structure of the company was changed somewhat to permit of a change in certain officers. The articles of incorporation were also revised to allow the company to engage in other lines of business than it has previously. Announcement is made that the main office of the company has been changed from Ivorydale to the Gwynne Building, Cincinnati. Offices in the latter building have been occupied for some time past by the company and the change does not incur an actual move. Procter & Gamble Co. owns the entire common stocks of the Procter & Gamble Manufacturing Co., Procter & Gamble Distributing Co., Procter & Gamble Co. of Canada, Ltd., Procter & Gamble Transportation Co., and the Buckeye Cotton Oil Co.

Innis, Speiden & Co., dealers in vegetable oils and chemicals, recently removed their general offices from 46 Cliff St., New York, to 117-119 Liberty Street, in the Roebling Building. The new telephone is Cortland 5803 to 5810.

Spencer Kellogg & Sons recently purchased the properties of L. C. Gillespie & Sons in Hankow, China, which have been devoted to the refining of chinawood oil.

Owens-Illinois Glass Co. announce the appointment of Howard L. Murray as advertising manager. Mr. Murray was in the advertising department of Owens Bottle Co. for several years, before the merger.

The plant of W. C. Hardesty Co., Pittsburgh, manufacturers of stearic acid, red oil, and glycerine, was completely destroyed by fire recently. Not one building was left standing.

Market Report on

FATS, OILS AND GREASES

(*As of August* 30, 1929)

New York—After the flurry of rising prices a month ago, the market for oils, fats and greases quieted down and numerous price declines were noted. It was indicated that a number of large users had bought material on the rising market, removing a good part of the demand from the field. Coconut oil was priced lower here and on the Coast. Domestic users were well covered and showed no tendency to bid the price up. Corn oil also declined during the period. There was little interest in this item, and few sales were reported. Prices on tallow and lard were shaded all along the line. After advancing several points during the month, olive oil again dropped in price and closed at last period's final figure. Cottonseed oil was priced slightly lower after a period of inactive trading during which price changes were confined within narrow limits. Red oil showed the principal gain reflecting the recent advance in the price of raw material. Linseed oil was also quoted higher as the crop forecast was again revised downward.

Chinawood Oil

Chinawood oil remained in a firm position with quotations practically unchanged from the figures set at the close of last period. Coast tanks sold at 13½c lb., with spot stocks 1c lb. higher in barrels or drums.

Coconut Oil

After advancing sharply last period on the strength of foreign buying, coconut oil dropped again during the recent period, due to the fact that buyers were well supplied. Manila tanks in New York were quoted at 7c lb., a half cent under closing prices for last period.

Corn Oil

Corn oil continued to drop in price, despite the fact that stocks were light. There was little buying interest and few sales.

Cottonseed Oil

The cottonseed oil market was quiet, with buying interest holding off until more information is available on the cotton crop now in growth. The government cotton report, issued August 8, predicated a yield of 15,543,000 bales, a larger total than had been expected by the trade. This exerted a bearish effect on the market.

Grease

After rising during the month, the greases held steady, and closed at uniformly higher levels. Quotations on yellow and house grease were 7⅛ to 7¼c lb., with brown grease an eighth of a cent lower. Export business, which brought on the recent price advance, continued good.

Lard

The lard market was quiet, with a fair amount of business being done in small lots. Prices were reduced ¼c to ½c on the various grades. City tierces brought 12¼c lb., with the compound at 11¼c to 11½c.

Linseed Oil

Expectation of a short crop continued to push prices up in the linseed oil market. The hot, dry season has been unfavorable for the growth of flaxseed, and although more acreage is under cultivation, the crop will be smaller, due to a lessened yield. The price of raw oil in tanks was 11-9/10c lb. at the close, ⅕c above last month's closing. Other prices on the schedule were equally higher.

Olive Oil

Olive oil was down again in price after its recent recovery at the close of last period. With a good crop anticipated, and consumption in United States diminishing, suppliers were again forced to reduce quotations to the $1.00 gal. mark. Foots were, unchanged, and were quoted again at 9c to 9¼c lb.

Tallow

Large buyers are reported to have made extensive tallow purchases recently, taking care of their requirements and weakening the demand side of the market. In consequence prices have been reduced and the market is in a much easier condition.

Alkalis

Slackened demand in various industries due to seasonal influences reduced shipments, although more material was moving out than was the case at this time in 1928. The outlook for fall business is considered good.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.14¼	.14½
Coast, tanks, spot	lb.	.13¼	.13⅜
Futures	lb.	.13¼	—
Coconut, Ceylon grade, bbls.	lb.	.08	.08⅛
Coast, tanks	lb.	.07⅛	—
Cochin grade, bbls.	lb.	.08½	.09
Manila, bbls.	lb.	.07¾	.08
Tanks, N. Y.	lb.	.07	—
Coast, tanks	lb.	.06⅝	.06¾
Fatty acids, mill, tanks	lb.	—	.10¾
Cod, Newfoundland, bbls.	gal.	.63	.64
Copra, bags, coast	lb.	.04⅛	.04¼
Corn, tanks, mills	lb.	.07¾	.08
Bbls., New York	lb.	.10¼	—
Refined, bbls.	lb.	.11	—
Fatty acid	lb.	.09	—
Cottonseed, crude, tasks, mill	lb.	—	Nom.
P. S. Y.	lb.	.09	.09¼
Fatty acids, mill, bbls.	lb.	.09¼	—
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03½	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bols.	lb.	.06½	.07
Greases, choice white, bbl. N. Y.	lb.	.08½	.09½
Yellow	lb.	.07⅛	.07¼
Brown	lb.	.07	.07⅛
House	lb.	.07⅛	.07¼
Bone Naptha	lb.	.06⅝	—
Herring, coast tanks	gal.	.40	nom.
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.12¼	—
Compound, tierces	lb.	.11¼	.11½
Middle Western, tierces	lb.	.12½	—
Neutral, tierces	lb.	—	.13½
Prime Western, tierces	lb.	.12¾	--
Lard oil, No. 1, bbls.	lb.	.11¼	—
No. 2, bbls.	lb.	.11	—
Extra bbls.	lb.	.12	—
No. 1, bbls.	lb.	.11¾	—
Winter strained, bbls.	lb.	.12½	—
Prime, bbls.	lb.	.14¾	—
Linseed Oil, boiled, tanks	lb.	.1230	—
Car lots, bbls.	lb.	.1310	—
Less car lots, bbls.	lb.	.1350	—
Less than 5 bbls.	lb.	.1390	—
Double boiled, less than 5 bbls.	lb.	.1420	.1450
Raw, tanks	lb.	.1190	—
Car lots, bbls.	lb.	.1270	—
Less car lots, bbls.	lb.	.1310	—
Less than 5 bbls.	lb.	.1350	—
Calcutta, bbls.	lb.	.2030	—
Refined, bbls.	lb.	.1340	.1380
Varnish grades, bbls.	lb.	.1360	.1400
Linseed cake, bags	ton	—	47.00
Meal, bags	ton	56.00	—
Menhaden, crude, tanks, Baltimore	gal.	.46	—
Light pressed, bbls.	gal.	.67	.70
Yellow bleached, bbls.	gal.	.69	.72
White bleached, bbls.	gal.	.72	.75
Mustard, bbls.	gal.	.85	.90
Neatsfoot, cold pressed, bbls.	lb.	.18¼	—
Extra, bbls.	lb.	.12	—
No. 1, bbls.	lb.	.11½	—
Pure, bbls.	lb.	.14	—
Oleo, No. 1, bbls.	lb.	.11	—
No. 2, bbls.	lb.	.10	—
No. 3, bbls.	lb.	.09¾	—
Olive, denatured, bbls. N. Y.	gal.	1.05	1.15
Shipments	gal.	1.05	1.10
Foots, bbls.	lb.	.09	.09¼
Shipments	lb.	.09	—
Edible, bbls.	lb.	2.00	2.15
Palm, Lagos, casks, spot	lb.	.07⅞	.08
Shipments	lb.	.07¼	.07⅜
Niger, casks, spot	lb.	.07½	—
Shipments	lb.	.07⅜	—
Palm Kernel, pkgs.	lb.	.08½	.08¾
Tank cars	lb.	.08	—
Peanut, crude, bbls.	lb.	.11½	—
Mills, tanks	lb.	.08½	—
Refined, bbls.	lb.	.13¼	nom.
Perilla, bbls.	lb.	.15½	nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	.97	1.01
Refined, bbis.	lb.	.80	.81
Red Oil, distilled, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Saponified, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Salmon, coast, tanks	gal.	.44	nom.
Sardine, coast, tanks	gal.	.45	nom.
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.11	.11¼
Orient, coast, tanks	lb.	.09½	—
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15½	.16
Triple pressed, bags	lb.	.18	.18½
Stearine oleo, bbls.	lb.	.10	.10¼
Tallow, edible, bbls.	lb.	.09	.09¼
City extra, works, loose	lb.	.07⅝	—
Special, works, loose	lb.	.07⅜	—
Tallow oil, acidless, bbls.	lb.	.10¾	—
Tanks, N. Y.	lb.	.10½	—
Vegetable tallow, coast, mats	lb.	.08¼	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Vegetable Oils in Brazil

(*From Page 13*)

tablished in Brazil for chemists and agriculturists who have received their degrees in the agricultural colleges and other university institutions of the country. The material already acquired by the oils laboratory is valued at some $43,000, but the Government proposes to complete the installation with apparatus for essential oils, the extraction of glycerine, and the manufacture of candles and other articles. There could be no greater evidence of the confidence felt by the Government and people of Brazil in the future of its vegetable oil industry.

Bleaching Loss Coefficients

(*From Page 20*)

retention of any given bleaching material. Having arrived at a successful solution of the problem, we have not fully determined which portions of the procedure are critical and which are not. Nevertheless, since the method as we have used it seems to give satisfactory results, we offer it in the thought that it may be of some use to others, even though some of the details specified may represent useless restrictions.

Summary

DETAILED description has been given of a laboratory method for determining oil retention by bleaching earths and carbons. The method involves determination of the increase in weight resulting when a sample of the bleaching material is treated with oil and the excess oil removed by suction in a stream of hot inert gas under standardized conditions. The oil retention values obtained by this method fall within the range of those observed under practical conditions of plant operation.

Bakery Research Laboratory

(*From Page 21*)

they bake a complete line of pies, pastries, cakes, doughnuts, and icings. These visits are becoming more and more popular and give promise of developing into small baking schools where several bakers will receive instruction at the same time.

The Bakery Research Department has published booklets on the following subjects: Danish Pastry, doughnuts, cookies, icings, pies, and cakes. In addition to this educational material, numerous bulletins on subjects relating to bakery practice have been issued and a good many magazine articles have been prepared. These bulletins and articles have covered a variety of problems. New methods for cake manufacture, nut frying, potato chip frying, eliminating mould from the bakery, reducing the overhead cost, together with articles on the manufacture and proper use of fats, are examples of this type of work. The Bakery Research Department maintains a complete formula service for bakers and the files contain hundreds of formulas for almost every conceivable type of pastry and other baked goods.

The Secretary of The American Oil Chemists' Society desires to call the attention of the members of the Society to the requirement of the use of a clear colorless glass in connection with many color readings of oil under the new rules on color reading. The glass to be used must be a standard one. Standard glasses for this purpose may now be obtained from the Secretary of The American Oil Chemists' Society, 705 Tchoupitoulas St., New Orleans, Louisiana. The charge for such glasses is fifty cents each, plus postage.

Census Report

(*From Page 36*)

EXPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED JUNE 30, 1929

KIND	Pounds	KIND	Pounds
Fish oils	7,664	Palm & palm-kernel oil	790,239
Other animal oils & fats, inedible	185,384	Peanut oil	10,948
Olive oil, edible	33,003	Soya-bean oil	1,517
Tung oils	1,568,083	Other expressed oils & fats	70,389
Coconut oil	563,566	Vegetable wax	345,599

EXPORTS OF DOMESTIC FATS AND OILS, QUARTER ENDED JUNE 30, 1929

KIND	Pounds	KIND	Pounds
Oleo oil	16,470,589	Other animal greases & fats	16,834,209
Oleo stock	2,197,038	Cottonseed oil, crude	2,479,598
Tallow	526,833	Cottonseed oil, refined	1,759,203
Lard	190,587,381	Corn oil	96,066
Lard, neutral	3,339,235	Vegetable oil lard compounds	1,624,887
Lard compounds, containing animal fats	857,152	Other edible vegetable oils and fats	832,172
Oleo & lard stearin	1,398,351	Coconut oil	7,215,433
Neat's-foot oil	175,438	Linseed oil	483,695
Other animal oils, inedible	205,250	Soya-bean oil	3,231,953
Fish oils	166,756	Vegetable soap stock	1,407,602
Grease stearin	736,215	Other expressed oils and fats, inedible	2,272,155
Oleic acid, or red oil	1,166,807	Glycerin	321,231
Stearic acid	338,109		

OIL & FAT INDUSTRIES

The Editor's Page

Protectionists Persist

THE high-tariff advocates are already shaping their plans for the future. Feeling that efforts further to increase the tariff on sugar, vegetable oils and similar commodities will be unsuccessful at this time, particularly in the face of Presidential opposition to such procedure, they are reverting again to the proposal to levy full tariff duties on all products imported from the Philippine Islands. The latest effort in this direction has taken the form of a proposed amendment to the tariff act, sponsored by Senator Broussard of Louisiana. Senator Broussard proposes to return to the Philippine Treasury all receipts of duties on Philippine products collected at American ports, the proceeds to be used in furthering educational and other development in the Islands, in order that they shall be sooner prepared for the complete independence to which some of the natives aspire. At the same time, of course, all industries in this country which come into competition with Philippine produce will have the benefit of the added protection. The sugar cane planters of Senator Broussard's State and the beet growers of the Middle West would see the growing menace of Philippine sugar partially checked, and the copra crushers, the tobacco growers and the rice planters would all join in praise.

The prevalent opinion in informed circles in Washington is that the backers of Senator Broussard's proposed amendment do not confidently expect it to be successful in connection with the pending tariff legislation, but are skillfully laying their lines for a real fight in the next Congress on this issue.

This suggested amendment comes on the heels of a suggestion on which the domestic and Cuban sugar producers have been conferring, looking to the placing of a differential tariff against Philippine sugar, equal to the increase in the duty on Cuban sugar. Its proponents lost hope of securing the adoption of this proposal when Secretary of State Stimson went before the House Ways and Means Committee and denounced the plan to limit the amount of Philippine sugar which could be imported to this country.

The time seems to approach when our Congress and indeed the Administration as a whole must adopt a fixed program in relation to the Philippine Islands, and give the Filipinos and Americans (in the Philippines as well as at home) positive assurance that the program will be adhered to over a period of years. If those who claim the Islanders have been promised their independence are correct, and if the Filipinos really desire that independence, a definite program looking to such grant within a given period of ten or twenty years, should be adopted and adhered to. It might then be desirable to build gradually a system of import duties on the products of the islands, so that at the time of assuming independence, the Philippine industries would not suffer from the sudden erection of a high tariff wall around their best market. If, on the other hand, we are to stand as guide and protector to this infant nation for an indefinite period of years, it seems absurd to threaten them every year with the club of a tariff barrier held over their commerce with us, their avowed friend and guardian.

Discounts and Credits

IF there are any things in the daily routine of business which are abused more than another, they are credit terms and cash discounts. There are those who will attempt to deduct a so-called cash discount from invoices which are thirty and sixty days old, and there is no end of firms who will permit this practice in order to avoid controversies with customers. Houses without number have all sorts of credit rules and regulations which are just so many empty words because the rules are never enforced. The reasons for this are obvious. Attempts to enforce such rules frequently cause a certain class of buyers to shift their business elsewhere. Sellers do not want to lose this business and as a consequence, permit many buyers to do just about as they like in the payment of bills and deduction of discounts.

Where there is a set of group credit rules, formulated by a trade association or agreed to by a number of firms who join together for this purpose, the problem is somewhat simpli-

fied, that is, it is simplified if *all* the members of the group adhere strictly to the regulations as written. A group of printing paper manufacturers and dealers in Cincinnati have recently formed a new group of this type and laid down a set of rules. Up to and including the fifteenth of the month following the month of purchases, (an average of the thirty day period) a two percent discount is allowed. After that, bills are net. Bills unpaid by the first of the following month, are reported by the members to a central clearing house and a reporting system advises all the members of this delinquency, after first, however, notifying the debtor in advance that unless he pays, his name is to be added to the delinquent list. Should the bills still remain unpaid on the tenth of the next following month, all further credit courtesy is withdrawn from the debtor by *all* members of the credit group and he is placed upon a strictly cash basis until such time as his account is reported paid in full by the central clearing house.

This method of handling the discount and credit problem through a trade group is not new. The formation of the new group in Cincinnati, however, emphasizes the growing trend to get together among various industries and local trades to whip the delinquent debtor into line and to prevent his playing one house against the other, so common where there is no cooperation among competitors. Long term credits and cash discounts are relics of the Civil War cash stringency days and really have no logical place in the scheme of modern business. Be that as it may, they are still with us and are likely to be for some time to come. Next best to their complete elimination is a strict enforcement of terms, and the most effective way to enforce any set of rules is through group action.

Whale oil imports into Great Britain during the first six months of 1929 totaled 41,061 tons, as compared with 33,114 tons in the corresponding period in 1928, an increase of approximately 24%. The value was $6,547,778, as compared with $5,072,012 during 1928. Additional vessels now being equipped for use in the whale oil industry number thirty-five.

A fatty acid peroxide is produced by treating an aliphatic acid chloride such as lauryl chloride with a solution of an alkali metal peroxide.—U. S. Pat. No. 1,718,609.

United Africa Names Officers

The United Africa Co., Inc., New York, formed through a consolidation of African & Eastern Trading Co. and the Niger Co., announce the election of R. G. Morris as president and of J. H. Redding as chairman of the board. Mr. Morris was formerly head of A. & E. and Mr. Redding was president of Niger. Other officers of the new company include L. E. Wingrove, formerly of Niger Co., treasurer, and E. A. Fitter, African & Eastern, secretary. Mr. Redding will have charge of the palm oil department, with Robert S. Hebert and Dudley T. Bloodgood as his assistants. Mr. Morris is head of the cocoa division, assisted by H. W. King. The new officers of the company, located on the twentieth floor of a new building at 205 E. 17th St., are newly furnished throughout with American walnut equipment. They are arranged so one separate wing is available for the palm oil department with another for cocoa, the general secretarial and bookkeeping section being in between. At the entrance to the offices the flooring consists of a large map of Africa with the name of the company running through it.

Cottonseed crushings in United States during the year ended July 31 totaled 5,058,744 tons as compared with 4,654,017 tons in the previous year, according to recent Census Bureau figures.

Stocks of crude cottonseed oil on hand Aug. 1, 1929, amounted to 20,350,682 lbs., as compared with 16,296,641 lbs. on hand at the same time in 1928, according to Department of Commerce figures. Stocks of refined oil available in various parts of United States on Aug. 1, 1929, were only 335,993,223 lbs., as compared with 378,612,700 lbs. at the same date in 1928.

Foreign Trade Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces that its representatives in all parts of the world have forwarded the following trade inquiries of interest to our readers. In writing the Bureau in reference to any of these inquiries please mention that you saw it in *Oil & Fat Industries.*

No.	Location	Material	Purchase or Agency
40570	Mexico	Copra	Purchase
40568	India	Stearic Acid	Purchase
40569	Malta	Lard	Both
40711	Guatemala	Salad Oil	Sole Agency
	Barbados	Linseed Meal	Either

Mayonnaise Manufacturers' Convention

Fourth Annual Meeting Scheduled for Atlantic City Promises Instructive and Entertaining Program

THE Mayonnaise Products Manufacturers Association of America, Incorporated, have announced their Fourth Annual Convention, to be held at Atlantic City, October 28-29-30, 1929. The President, the Secretary and the Convention Committee have arranged a program dealing with subjects of timely interest to all the members and to all others engaged in the mayonnaise or allied industries. Many of the delegates, with their friends, will doubtless take advantage of the opportunity to spend the weekend at Atlantic City, where the weather is most delightful in October.

The various committee meetings are scheduled for times which will not conflict with the general session meetings. The Research Committee will meet on Saturday, October 26, and the Board of Directors will hold its first meeting of the Convention on Sunday evening, October 27.

The general sessions of the Convention will start on schedule, Monday morning, October 28, with President C. P. McCormick (Vice-President of McCormick and Company) presiding. Interesting sessions are scheduled right up to Wednesday, October 30, at noon, when the Convention will adjourn. On Tuesday afternoon, October 29, there will be a Technical Session, for Active Members only. A general Technical Session, perhaps apart from the regular sessions, is also planned.

The program of the Convention, as announced to date, includes the following addresses by authorities on their respective subjects:

"The Future of the Mayonnaise Industry" by Richard Hellman.

"Trade Practices" by Hugh P. Baker, U. S. Dept. of Commerce.

"Selling the Chain Store" by H. H. Lestico.

"Salad Dressings" by Albert K. Epstein.

"Foreign Markets" by Franklin P. Johnson.

"The Increase in Mayonnaise Consumption" by R. S. Hollingshead, U. S. Dept. of Commerce.

"The Behavior of Mayonnaise at Low Temperatures" by Benjamin R. Harris.

"Caps and Closures" by Jules Dommergue.

"Malt Products" by W. M. Brownell.

"Eggs" by Marvin C. Reynolds.

"Pickles" by H. A. McGinnis.

"Spices and Mustards" by C. P. McCormick.

"Oils" by David Wesson.

"Vinegar" by E. P. Kelly.

There will be several other addresses and many important committee reports will be presented. There will also be informal round table discussions where members will be able to exchange ideas, so that each member or visitor who attends the convention can return home feeling that he has been practically benefited by rubbing elbows with the other fellows, and giving, as well as taking, some new thoughts.

The ever-present topic of sales and distribution practices will be discussed fully at the Mayonnaise Manufacturers' Convention. The opinion seems quite general throughout the Association that the practice of giving free goods to jobbers or dealers as a bonus for ordering the commodity, is extremely detrimental and harmful, not only to the trade as a whole, but particularly to the manufacturer who makes such a deal. When a dealer is thus overstocked, the mayonnaise is apt to deteriorate in quality before being sold to the consumer, with the inevitable result that the purchaser will develop an antipathy to that brand of mayonnaise; in fact to all manufactured mayonnaise. Such a prejudice, once established in the consumer's consciousness, is extremely difficult, if not impossible, to remove.

Entertainment Features

MONDAY night at the Convention will be known as "Philadelphia Night," as the Philadelphia Delegation have announced their intention of entertaining all the other delegates in a most interesting manner on that night. All who attend are requested to keep Monday night open for dinner with the Philadelphians.

The Annual Banquet will be held on Tuesday night, October 29. A most interesting time at the banquet, even better than that of last year, is promised. E. E. Finch will be Toastmaster.

The Selection of Mayonnaise Equipment

Effect of Metals on the Keeping Qualities and Nutritional Value of Mayonnaise and Salad Dressing

By ALBERT K. EPSTEIN

NO problem which the manufacturer of mayonnaise and salad dressings has to face is more serious than the problem of preventing or delaying the development of rancidity in his products. The question of rancidity is of such great importance that it affects the nature of the distribution. All manufacturers strive to have a product which will possess maximum keeping qualities, and which will reach the housewife in a satisfactory condition after traveling through various avenues of distribution, from the factory to jobber, from jobber to retailer.

In the course of time mayonnaise and salad dressings become rancid and unsalable. The oils in the mayonnaise and salad dressing have a tendency to absorb oxygen, but they do not absorb oxygen as soon as they come in contact with the atmosphere but pass through a period during which there is practically very little oxidation. This period is the so-called induction period. As time progresses the oils become more susceptible to oxidation and the spoilage of the product increases very rapidly. The problem consists in eliminating all possible factors which will reduce the induction period and hasten rancidity, thus prolonging the keeping qualities of the finished product.

Among the factors which contribute to the spoilage of mayonnaise products and tend to make them rancid, is the presence of certain "*metals*". From studies made on the effect of metals on butter-fat and other oils, it is known that certain metals act as catalysts or accelerators, decreasing the induction period of the oil and making it more susceptible to oxidation. Therefore, if the fatty compound contains appreciable quantities of said metals, the keeping qualities of such product will decrease and when placed on the market it will turn rancid in a relatively shorter period of time. Among the metals which have an effect upon increasing the susceptibility to rancidity are iron and copper. It has been shown by Hunziker & Hussman (1) and by Rogers, Berg, Potteiger & Davis (2) that small amounts of iron or copper incorporated in butter produces quick spoilage. Supplee (3) has also shown that copper salts added to milk in quantities between ten to fifteen parts per million will accelerate the production of "tallowiness" in a milk product even when it is in a dry state. The presence of a small amount of iron in an oily food product also has the effect, although in a much smaller degree than copper, of increasing the process of rancidity (4). In the course of manufacture, fatty food products become contaminated with small amounts of metals from the utensils and equipment used, and as a result turn rancid in a relatively shorter period of time. Mayonnaise and salad dressings contain a considerable amount of acid varying from ½ to 1½%. When in contact, during the manufacture and packing, with utensils and machinery they may become contaminated with metals which will shorten the keeping qualities of the finished products and accelerate their spoilage (5).

M. C. Reynolds (5) has pointed out that the acid of mayonnaise will dissolve out the iron from a poorly tin-lined tank and that very small traces of iron are detrimental to the keeping qualities of mayonnaise products, and recommends enamel ware whenever possible or a non-corrodible metal. He also calls attention to the fact that faulty liners in caps sometimes contribute to rancidity. These liners become soaked with the mayonnaise, the caps becoming rusty on the inside, and the rust coming in contact with the mayonnaise accelerates its spoilage. He recommends an oiled paper liner with a paraffine coating and cardboard backing as the most satisfactory liner developed so far. From a commercial standpoint the ideal metals have not yet been discovered which will be absolutely inert to salad dressing products. However, it is known that copper and iron are detrimental and efforts should be made

by the manufacturer to eliminate these metals as much as possible from his finished product.

From practical experience the following may be suggested to help the manufacturer in keeping objectionable metals out of his products. Tin lined copper measures from which tin has been worn off should not be used to measure out vinegar. Neither should enamel measures be used from which the enamel has been chipped off as the exposed iron will tend to dissolve in the vinegar. The bowls in which the product is emulsified should be retinned frequently. If a homogenizer is used in connection with the manufacturing of salad dressing or mayonnaise it should be washed each and every day and certain portions of it should be replated, as frequently as necessary. Measuring cans used for measuring oil which are attached to some of the bowls should be kept clean and retinned, and preferably made from a non-corrodible metal. Holding tanks and sanitary gate valves should be glass lined. Brass faucets should not be used as there is a considerable amount of splashing during manufacture and the acid product dissolves some of the copper forming green layers of copper acetate, thus contaminating the finished product. The filling machine should be cleansed and dried after each day's production.

Recently manufacturers have been preparing salad dressings which are cooked and contain a relatively large proportion of vinegar. It is essential in order to keep the product in good condition not to use copper utensils for the preparing, mixing or stirring of such product. It is essential that the hot vinegar should not come in contact with any iron or copper utensils or with enamel ware which has been chipped off. Glass lined tanks are most suitable for this purpose. Wherever possible properly tinned equipment or glass lined equipment should be used.

From carefully controlled large scale experiments performed we have found that it is possible to eliminate metals from the mayonnaise and salad dressing if special precautions and proper care are taken and that such products will keep in a better condition for a much longer period of time than mayonnaise and salad dressings which are contaminated with appreciable quantities of iron and copper. Aluminum utensils are suitable when the products are cold. Aluminum and tin have practically no effect with regard to increasing rancidity in mayonnaise products. A rancid mayonnaise and salad dressing is not palatable nor appetizing and has less nutritional value. Hess and Unger ([6]) and others ([7]) have shown that an oxidation process resulting in the rancidity of food products containing oil or fats has a tendency to destroy vitamins A, E and C. In other words the presence of metals in mayonnaise products tends not only to make the product rancid but also to reduce the biologic food accessories derived from the yolk material and other ingredients present in the product.

A number of recently developed salad dressings which are made by the cooking process and which contain an especially large amount of acid have been found to be rancid and upon analysis it was discovered that these products contain an excessive amount of metals. While we have not the ideal equipment which is especially suited for the mayonnaise industry, however if sufficient precaution is taken a considerable amount of the trouble may be avoided.

---

[1] Hunziker, O. F. and Hosman, D. F. J. Dairy Sci., 1, 4 (1917).
[2] Robers, L. A., Berg, W. N., Potteiger, C. R. and Davis, B. J., Bull. 162. Bur. An. Ind., U. S. Dept. Agr. (1913).
[3] Supplee, G. C., Proc. World's Dairy Congress, 1923, 1248.
[4] W. L. Davies Deterioration of Fats Chemical Age 20. 482-92. May 25, 1925.
[5] M. C. Reynolds "Factory Planning and Sanitation of Mayonnaise Factories,"Spice Mill Feb. 1927.
[6] A. F. Hess and L. J. Unger: The Destruction of Anti-scorbutic Vitamines in Milk by the Catalytic Action of Minute Amounts of Copper. Soc. Exp. Biol. & Med. Vol. 19—page 119 (1921).
[7] L. S. Frederica; Inactivating Action of Some Fats, Vitamin A in other fats—Biological Chem. 62, pages 103-104 (1925).
H. A. Mattill: The Oxidative Destruction of Vitamin A and E. Journal Amer. Med. Ass., page 1505 (1927).
Neils Sjossler: On the Sulphuric Acid Reaction of Butter Fat and The Disappearance of the Reaction from Butter Fat through the Action of Oxidized Fat. Jour. Biol. Chem. 62 (1925), pages 487-493.
C. C. Supplee and Odessa D. Dow: Reproductive Potency of Dry Milk as Affected by Oxidation. Jour. Biol. Chem. 63 (1925), pages 103-114.
[8] Albert K. Epstein: The Story of Mayonnaise. Home Economic Journal, March 1929.

The Buckeye Cotton Oil Company, a subsidiary of the Procter & Gamble Company, Cincinnati, has acquired the plants of the Dixie Cotton Oil Company, Memphis, and the Louisville Cotton Oil Company, Louisville. The transaction involved approximately $1,000,000.

The annual golf tournament of the Oil Trades Association of New York was held at the Westchester Hills Golf Club, White Plains, September 24. The weather was fine, and the attendance large. About eighty members and guests were present, and the affair was voted one of the most successful outings in the history of the association.

The Chemical and Physical Characteristics of Cod Oil

(Industrial Cod Liver Oil)

By Arthur D. Holmes, Walter Z. Clough *and* R. J. Owen

RECENT[1] study of the chemical and physical characteristics of medicinal cod liver oil obtained on the open market show that these characteristics vary over wide limits. In the analyses of these medicinal oils the minimum and maximum values obtained were for specific gravity 0.920 to 0.927; for refractive index 1.477 to 1.482; for saponification number 180.8 to 190.8; for iodine value 147.5 to 183.1; for free fatty acid 0.27% to 1.65% and for unsaponifiable content 0.97% to 1.40%.

In view of these results it seemed desirable to collect data concerning the chemical and physical characteristics of non-medicinal cod liver oils. Such oils although prepared from cod livers appear in the trade under the designation "cod oil." The physical appearance of non-medicinal cod liver oils is far from uniform. In color they vary from a yellow with a slight tinge of red to oils which are so dark as to be practically black. The lighter colored oils are usually quite fluid whereas some of the black oils are so viscous that they pour very slowly. The odor of cod oils increases quite consistently with the intensification of their color. In brief, the cod oils as a group vary in appearance all the way from oils that just fail to classify as medicinal cod liver oil to the dark viscous ill-smelling oils.

In general, the cod oils are prepared from livers that are more or less decomposed. The light colored cod oils are obtained from livers which may not have been removed from the fish for more than a few days. On the other hand the very heavy, dark oils are obtained from livers that may have been decomposing for months. Probably the larger portion of cod oils are produced by the so called "rotting process"—that is by the natural decomposition of the livers. However, a certain amount of cod oil is produced by cooking partially decomposed livers. The yield of oil when cooking is employed is somewhat larger than when the livers are merely allowed to decompose.

Information concerning the chemical and physical characteristics of non-medicinal cod liver oils is of particular interest because as a consequence of the extended use of cod liver oil for animal and poultry feeding, it is frequently questioned whether cod liver oil which does not meet the U.S.P. specifications as regards chemical and physical characteristics may be used for feeding animals or poultry.

In connection with the use of non-medicinal cod liver oil for animal or poultry feeding, the Federal Regulatory Service has ruled that when cod liver oil is sold as "cod liver oil" it shall meet the U. S. P. specifications as regards chemical and physical characteristics regardless of whether it is to be used for human, animal or poultry consumption. This would seem to be a perfectly proper ruling for obviously the purchaser of dog biscuit, fox biscuit, or start-growing or laying mashes for poultry reputed to contain cod liver oil has a right to expect that these products contain what has been legally defined as "cod liver oil."

Some of the best quality of non-medicinal cod liver oils just fall short of meeting the U. S. P. specifications for medicinal oil. The Federal Regulatory Service permits the sale of such oils for animal and poultry feeding purposes providing the seller designates these oils as "not U. S. P." and includes on the label a clear statment of the extent to which the oil deviates from the U. S. P. specifications. The latter provision by the Federal Regulatory Service would seem to amply cover the use of non-medicinal cod liver oil for animal and poultry feeding purposes in so far as this discussion is concerned.

Uses of Cod Oil

LARGE quantities of cod oil are used annually by the leather industry and the improvements in manufacturing conditions in that industry are making a constantly increasing demand for more exact information concerning the chemical and physical characteristics of the cod liver oil destined for use in that industry. Such oil is known in the trade under a variety of names—"cod oil," "No. 2 cod liver oil," "tanked cod liver oil," "sun-tried cod liver oil," "industrial cod liver oil," and "tanners oil." Nevertheless these oils are most generally described as "cod oil."

Formerly when practically all leather was dyed black or very dark color, cod oil of almost any description would serve the needs of the leather tanner. At present, however, when there is a large demand for light colored leathers for sport shoes, hand bags, and bookbinding, it is essential that the cod oil used in their manufacture shall be of relatively light color and of fairly uniform characteristics.

For the purpose of this study, the authors obtained from a variety of sources cod liver oils which with one exception (sample No. 871) were being offered for sale as "cod oil." Sample No. 871 was purchased on the open market as a cod liver oil for poultry. Its high acid value, dark color, odor, and general appearance were such that the authors felt that it should properly be classified as a cod oil, and, accordingly, it has been included in this study. The jobber that supplied sample No. 865 stated that inasmuch as this oil was rather light colored for a cod oil and was obtained from a concern which deals in oil for poultry feeding, it is quite possible that this oil was intended for poultry although it was sold as cod oil. In general, very little information could be secured concerning the history of the oils under consideration. Table No. 1 contains the information that was supplied concerning the oils studied.

DESCRIPTION OF COD OILS

Sample Number	Description of Sample
865	Intended for poultry feeding.
866	Cod oil.
867	Rotted oil produced in winter.
868	Pure Newfoundland cod oil.
869	Rotted cod liver oil.
870	History unknown.
871	Vitamin tested cod liver oil.
872	Tanners cod oil.
903	Cod oil used in tannery.
904	Pure Newfoundland cod oil.
905	Newfoundland cod oil—sun rotted.
906	Cod oil used by Tanning Industry.
907	Cod oil.
895	Tanked Newfoundland cod oil.
896	Pure Newfoundland cod oil.
897	English cod oil.
898	Newfoundland cod oil.
899	Pure Newfoundland cod oil.
900	Pure tanked Newfoundland cod oil.
901	Pure cod liver oil.

Such general information as that appearing in the above table in reality gives the customer practically no information concerning the nature of the oil which he has purchased. In fact, a survey of the leather industry serves to show that cod oil used for tanning is now largely bought by trade names or brands and principally on the basis of the customer's belief in the integrity of the seller. The seller, also, originally procures his cod oil under much the same conditions. Thus it is easy to appreciate why cod oils purchased under the same brand or trade name often fail to produce uniform results.

The chemical and physical characteristics of these oils were determined by the methods described in detail in the U. S. Pharmacopoeia[2]. The refractive index (not specified by the Pharmacopoeia) of the different samples of oil were determined by means of a Zeiss refractometer. The results of the chemical analyses of the cod oils under consideration are reported in detail in table No. 2.

The minimum and maximum values obtained were for specific gravity .9193 to .9266; for refractive index 1.480 to 1.483; for saponification value 184.0 to 194.5; for iodine number 146.3 to 168.6; for free fatty acid 7.24% to 20.17%; for unsaponifiable number 1.197% to 2.8%. Such a wide variation in the physical and chemical characteristics of the oils studied was to be expected in view of the wide variation in the physical appearance of the oils under consideration. These variations indicate very conclusively that different lots of cod oil as obtained on the open market are not equally adapted to the needs of a given process if uniform results are desired.

In order that the reader may more readily visualize the variation in the values obtained for the different characteristics, the values have been plotted as curves which appear in chart No. 431.

Conclusions

REFERENCE to the above chart shows that there are scarcely any two samples that have the same chemical and physical characteristics. Such information shows that there is a very definite need for developing standards for cod liver oil intended for industrial use. Establishing standards for cod oil would have a twofold effect. It would cause the cod oil producer so to control production conditions that he could supply the trade with cod oil of uniform quality which complied with the established standards. This in turn would provide the tanner with a standardized cod oil which would be of material assistance in the manufacture of uniform leather. This would particularly apply in the manufacture of chamois leather which involves a chemical reaction between collagen, the leather forming sub-

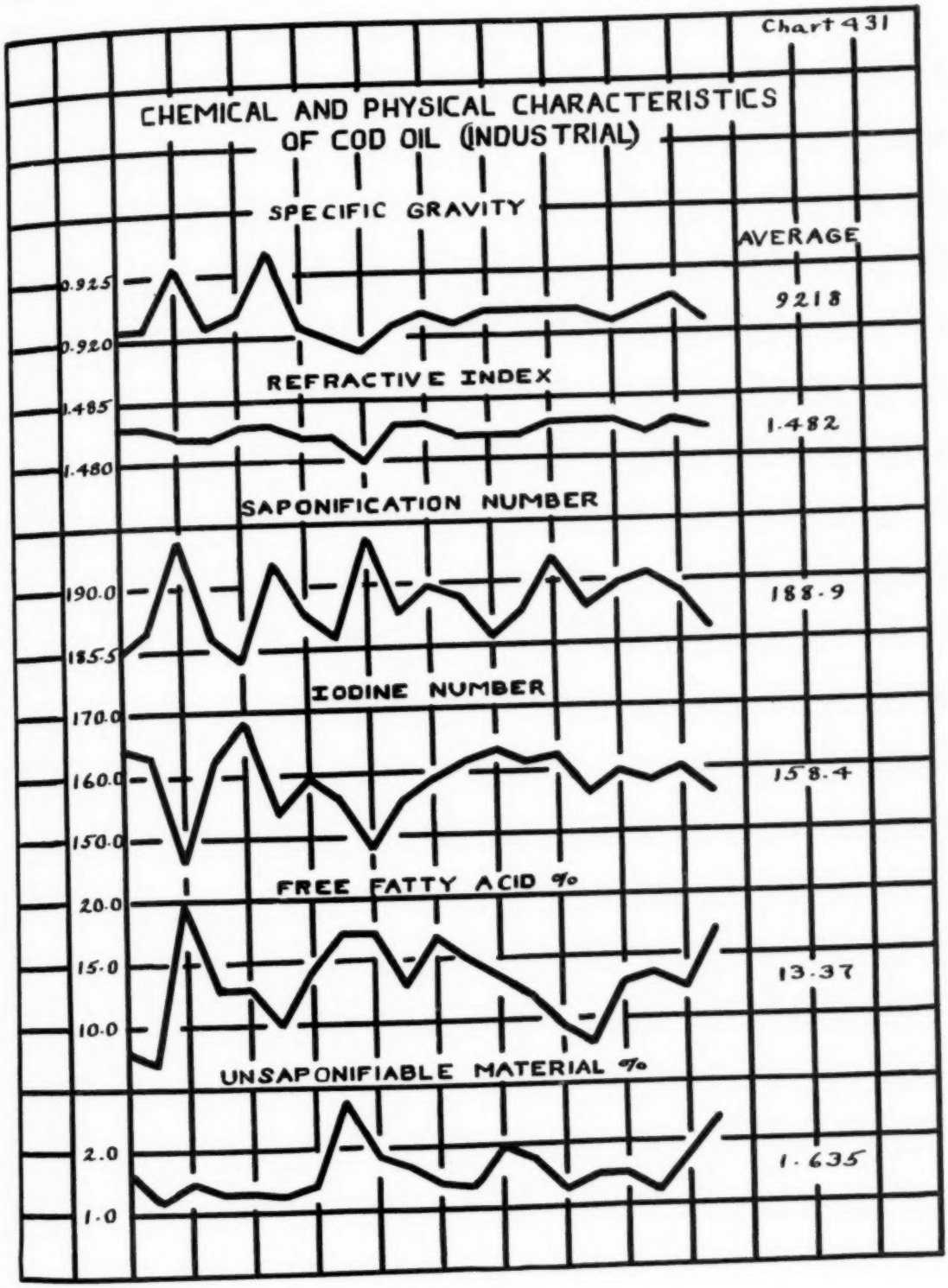


Chart 431
CHEMICAL AND PHYSICAL CHARACTERISTICS
OF COD OIL (INDUSTRIAL)
SPECIFIC GRAVITY
AVERAGE
0.925
0.920
.9218
REFRACTIVE INDEX
1.485
1.480
1.482
SAPONIFICATION NUMBER
190.0
185.5
188.9
IODINE NUMBER
170.0
160.0
150.0
158.4
FREE FATTY ACID %
20.0
15.0
10.0
13.37
UNSAPONIFIABLE MATERIAL %
2.0
1.0
1.635

Chart 431

stance of the skin, and the fatty acids of an easily oxidizable oil such as cod oil. Thus it is evident that there is a definite need for developing standards for cod oil. It is also obvious that the adoption and use of such standards by the trade would serve to stablize the cod oil industry which is now controlled by empirical procedures.

[1] The Chemical and Physical Characteristics of Cod Liver Oil—A. D. Holmes, and W. Z. Clough, Oil & Fat Industries, Vol. IV, No. 12, Dec. 1927.

[2] The Pharmacopeoia of the United States of America, Tenth Decennial Revision. J. B. Lippincott Company, Philadelphia, Pa. pp. 263-264.

TABLE 2

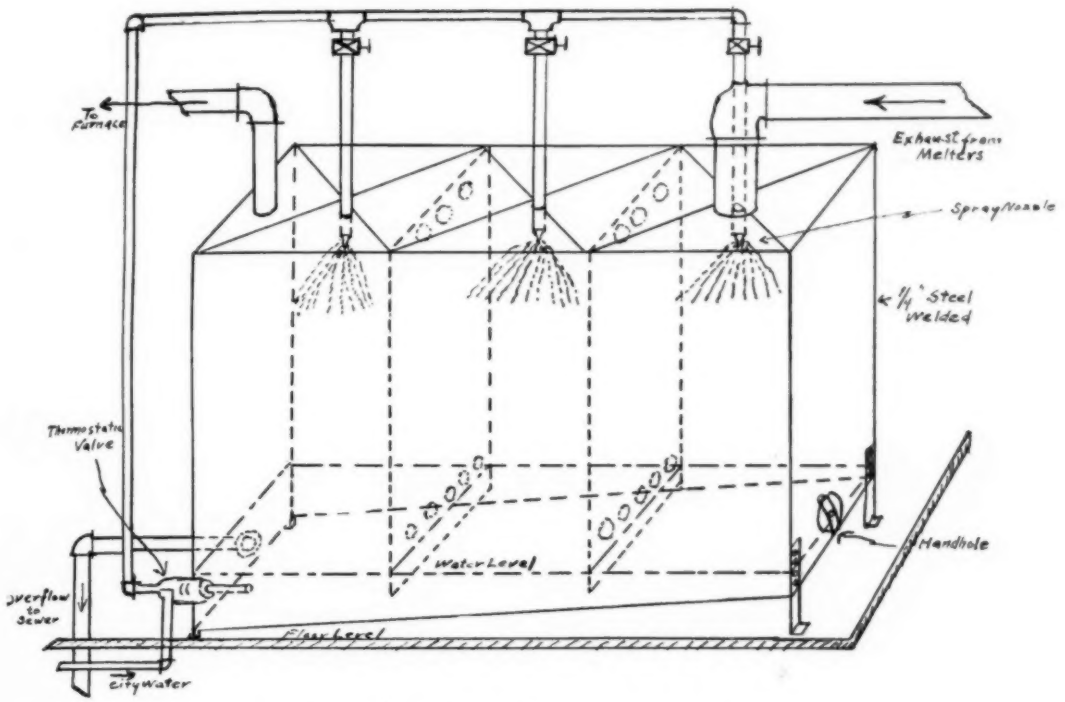
ANALYSES OF COD OIL

Sample Number	Sp. Gr.	Ref. Index	Sapon. Value	Iodine Number	F.F.A. %	Unsapon. Material %	Clouding Point
865	.9210	1.483	185.5	164.5	8.04	1.678	Cloudy at room temperature
866	.9213	1.483	187.8	163.0	7.84	1.217	Cloudy at zero
867	.9256	1.482	194.4	146.3	20.17	1.512	" " zero
868	.9210	1.482	186.2	163.9	13.01	1.348	" " zero
869	.9217	1.483	184.0	168.6	13.18	1.348	" " zero
870	.9266	1.483	194.5	154.1	9.99	1.255	" " zero
871	.9208	1.482	188.0	160.3	14.94	1.485	" " zero
872	.9199	1.482	185.7	156.5	17.46	2.800	" " zero
903	.9193	1.480	194.4	147.7	17.72	1.903	Slightly cloudy at zero
904	.9210	1.483	187.8	156.4	13.25	1.729	Cloudy at zero
905	.9223	1.483	190.2	159.8	17.03	1.404	" " zero
906	.9211	1.482	189.2	162.0	15.36	1.357	" " zero
907	.9219	1.482	185.7	163.8	13.98	2.076	" " zero
895	.9218	1.482	188.0	161.0	12.31	1.782	Cloudy at zero
896	.9224	1.483	192.0	161.7	9.10	1.267	" " zero
897	.9216	1.483	188.2	156.6	7.24	1.530	" " zero
898	.9210	1.483	190.4	159.8	13.05	1.523	" " zero
899	.9221	1.482	190.9	157.6	13.97	1.197	Solid at zero
900	.9230	1.483	189.0	160.1	12.53	1.802	Cloudy at zero
901	.9209	1.482	186.2	153.3	17.36	2.484	" " zero

Deodorizing Rendering Gases

A New Simple Device Which Has Been Effective in a Plant in a Large Mid-Western City

By S. C. STRUNZ



Diagrammatic sketch of the Strunz deodorizer for gases generated in rendering plants

EXHAUST gases from rendering plants have been the cause of untold troubles for years among renderers in all parts of the world. Where rendering plants are located in or near thickly populated areas or in the midst of large cities, as is frequently the case, constant conflict with city authorities is almost the inevitable consequence of the release of unpleasant odors upon the community. Renderers have always appreciated the difficulty of this problem and in some cases have solved it satisfactorily, although there still exist a great many plants which for one reason or another have been unable to solve it and as a consequence remain in conflict with the authorities.

The ill-smelling gases which accompany the rendering of fats are inherent in the business. Just so long as these gases are permitted to escape from the rendering plant, they will cause trouble. The solution of the problem is not to permit them to escape, but to remove them from the exhaust of the melters and destroy them. For this purpose, innumerable methods have been tried, including vacuum pumps and other means, but few have worked successfully. A system for deodorizing rendering operations which has passed the test of practical operation in the center of a large city, was designed several years ago by the writer under the stress of necessity. Other

methods did not prove effective; the method to be described has proved altogether successful and a patent on the equipment for this purpose has been applied for.

THE equipment as designed and now operated is composed of a large steel welded tank made of quarter inch steel and divided into three compartments of equal size by plates which extend from the top almost to the bottom. The bottom of the tank slopes off to permit draining and easy cleaning and the plates extend into the water which is always present in the bottom, forming a water seal. At the top of the steel dividing plates, there are three perforations of one-half inch diameter to permit escape of light gases which form at the top of each chamber. In the bottom of the dividing plates, just above the level of the water, are five two-inch openings through which the bulk of the gases and uncondensed steam may pass to the next chamber for further washing, cooling and condensation. Except for openings for the pipe line from the melter, for spray nozzle openings, for the exhaust gas outlet and for the water overflow, the tank is made gas tight. The diagram shows the general plan of construction.

Exhaust gases and steam from the melter come over through a four inch pipe into the top of the first chamber. The gas is subjected to a very fine spray of cold water as it enters the top of the chamber. The effect here is to create sufficient vacuum to have a constant pressure from the melter in the direction of the deodorizer. When the melter is shut down, there is no danger of water from the deodorizer being drawn back into the melter as is the case with some types of equipment. Some steam is condensed and gases washed and cooled in the first chamber by the spray. Uncondensed steam and gases pass through the openings to the second chamber and are subjected to a second spraying, then pass on to the third chamber for still a third spray operation. Volatile liquids, and minute portions of entrained solids are removed by the spray, falling into the water at the bottom of the tank. True gases which have been separated from the ill-smelling volatile liquid and solid constituents by washing with the cold spray, pass on through the third chamber and out through the top from which point they are piped to the boiler room and burned under the furnace.

The water in the bottom of the tank is kept at a constant level by an overflow pipe which leads to the sewer. The flow of water through the spray nozzles, which are Koerting nozzles with a one-eighth inch opening and which give a very fine mist, is controlled by a thermostatic valve immersed in the water at the bottom of the tank through the side wall of the tank. This valve is set to maintain a temperature of about 90° Fahrenheit in the water in the tank. This temperature is about as high as the water can be permitted to go into the sewer without a liberation of bad odors from the sewer waters, and at the same time, is fairly economical from the point of view of water consumption in the spraying operation. Of course, the lower the temperature of the water which overflows from the tank, the less chance there is of trouble from odors being liberated from this waste water when it is turned into the sewer. At the same time, to aim to keep this temperature too low means that the water consumption in the sprays will be somewhat greater than it should be. Ninety degrees was the temperature decided upon for actual use after trying out both higher and lower temperatures. The deodorizer operated at this temperature has worked very satisfactorily in the center of a large midwestern city, effectively eliminating the bad odors from the plant and surrounding community.

IN the practical operation of the deodorizer, several things were found out. A certain quantity of solid matter comes over from the melters and the compartments of the tank are equipped with hand holes so that this may be cleaned out from time to time after the tank is drained. A year or two may elapse before this becomes necessary. In actual use, the deodorizer is hooked up to two or three melters. When the melting operation is started, the first material to come over contains a large proportion of moisture in the form of steam, and as the melter continues and the temperature rises, the moisture content of the exhaust gases is reduced and the exhaust consists mostly of non-condensible gases and other volatile liquids. The melters are hooked in and run two together, that is, one is started and an hour or two later, the other is started so that the exhaust with a large proportion of steam from one is mixed with the dry exhaust of the other. This tends to equalize the temperature of the exhaust entering the deodorizer and has been found to be more economical in the matter of water consumption. In the meantime, a third melter and perhaps a fourth can be loaded or unloaded

(*Turn to Page* 43)

Oil Palm Development in Malaya

New Plantations Financed by Bond Issues Open to Popular Subscription in Moderate Sums

THERE are impressive preliminaries to the creation of an orderly estate on former jungle land. The felling of trees is in itself a big operation. Then follows what is known as "the burn," when fire is utilized to clear the land for cultivation. And "the burn" is a sight to remember. One that covered an area of a thousand acres took place in Johore recently, and in January another thousand acres will be set ablaze. And on these two thousand acres in due course will be seen flourishing palms, yielding valuable nuts. The estate is that, in the Kluang district in Johore, owned by Oil Palm Plantations, Ltd. Eventually there will on the company's land be 10,000 acres of oil-palm, an acceptable addition to Malaya's economic resources. Already plans are afoot for opening up an additional 2,000 acres, making 4,000 acres in all. And the wonderful thing is the manner in which money has been raised to finance this enterprise. There can be little doubt about the soundness of the oil-palm as a commercial proposition. But like other things it needs capital if it is to be efficiently exploited. And for several years past it has not been easy to raise big sums of money in Malaya. In this instance there were shrewd men who, while believing that they had a "big thing" in hand, hesitated to float a company on the ordinary lines, in such inauspicious times. Failure might have meant abandonment or the indefinite postponement of the whole proposition. Then someone thought of the "small man" with little or no savings, who can yet, given suitable inducement, raise a few dollars a month. Here is a really enormous sum of idle capital, customarily frittered away—for it is so difficult to put in the bank a mere few dollars at a time, when there are so many little ways of spending the money.

That "someone" remembered that in other countries bond issues are successfully made for industrial undertakings, being especially devised for the humble wage-earner who cannot find substantial sums with which to buy shares. Why not try this method in Malaya? No sooner said than done. The results were beyond all expectation. An issue was made of 6,000 bonds of $160 each, on the $10 down, $10 second payment, and thereafter $5 a month basis—a total of $960,000 to cover the development of 2,000 acres. A great deal of difficulty was anticipated in selling the bonds, because of the novelty of oil-palm cultivation in this country, and of raising capital by such means, and, quite properly, most people are very cautious about novelties. Yet within a few months the whole issue had been completed. All but a million dollars from "small" people during a time of trade depression. That is a real achievement, and it was made possible in several ways. First there was extensive advertising, and an able writer was set to work to explain all about the venture in a series of brief articles. The secretaries and territorial agents of the company freely distributed literature confirming and enlarging upon the information given in these articles, and readily answered any questions that potential bond-buyers put to them. There was no attempt to conceal from investors the necessity of waiting for several years, until the trees reached maturity before any return on the bonds could be looked for. And behind this campaign was the assurance given by the appointment of trustees (a responsible organization like the British Malaya Trustee and Executor Co., Ltd.) to protect the interests of bondholders and ensure the fulfillment of all obligations by Oil Palm Plantations, Ltd.

It was soon seen that the bond issue was going to be a success, and without delay activities were launched. A nursery for specially selected seedlings was started. The felling and the "burn" over, lining and holing are now being undertaken, and the seedlings planted where they will grow to maturity. This work is already in progress on the first thousand acres and will begin with the New Year on the second thousand acres, the seedlings for which will be sixteen months old—so much time saved on the way to production stage.

—*The Malaya Tribune.*

PECAN OIL

Contribution from the Oil, Fat and Wax Laboratory, Bureau of Chemistry & Soils, United States Department of Agriculture

By GEORGE S. JAMIESON & SAMUEL I. GERTLER

THE shelled nuts or "meats" from the tree *Hicoria pecan*, which is extensively cultivated in various regions in the Southern States usually contain from 60 to about 70 per cent of oil, but on account of their value for edible purposes, the salable "meats" cannot be used for the production of oil. However, the fine unsalable nut fragments which accumulate at the shelling plants can be utilized for the production of oil. The oil from sound nut waste has a very mild agreeable characteristic flavor and is an excellent salad oil.

Previous to the present investigation, pecan oil has received but little attention. Diehr and Fraps (J. Amer. Chem. Soc. 1910, 43, 90) examined a sample of the oil which they prepared with the following results: Specific gravity at 15/15° .9184, saponification value 198, and iodine number 106.

In view of a number of requests for further information on the characteristics and composition of pecan oil the following investigation was made on a sizable sample of the expressed oil which was kindly furnished by the Southland Pecan Company of Columbus, Georgia. This sample had a very mild, pleasant flavor. The chemical and physical characteristics of the oil are given in Table I.

TABLE I

Chemical and Physical Characteristics of Pecan Oil

Specific Gravity 25/25°	.9141
Refractive index 25°	1.4692
Saponification Value	190.
Iodine number (Hanus)	100.
Unsaponifiable matter (%)	.35
Acid value	7.0
Reichert-Meissl Value	.05
Polenske number	.30
Acetyl value	7.4
Saturated acids (Corrected) (%)	5.09
Unsaturated acids (Corrected) (%)	89.54
Iodine number of Unsaturated Acids	105.5

The percentage of saturated and unsaturated acids was determined by the lead-salt-ether method, and corrections were made for the small quantity of unsaturated acids that are precipitated and finally weighed with the saturated acid fraction (J. Amer. Chem. Soc. 1920, 42, 2398; Cotton Oil Press 1922, 6, 41). The percentage of unsaturated acids has also been corrected for the unsaponifiable matter that remains with the unsaturated acid fraction.

Unsaturated Acids

THE iodine number of the unsaturated acids is 105.5, indicating that this fraction consists of oleic acid (iodine number 90.1) and linolic acid (iodine number 181.4). The following percentage composition of the unsaturated acids was calculated from these figures.

		As Glycerides	
	Per cent	In Oil Per cent	In Oil Per cent
Oleic Acid	83.11	74.42	77.8
Linolic Acid	16.89	15.12	15.8

Slightly more than one hundred grams of the saturated acids were separated from the oil by the lead-salt-ether method and esterified in the usual manner with absolute methyl alcohol in the presence of dry hydrochloric acid gas (J. Amer. Chem. Soc. 1920, 42, 1200). The dry solvent free methyl esters (105 grams) were fractionated under a pressure of 3 mm. from a 500-cc. Claisson distilling bulb. The five fractions as well as the undistilled residue were redistilled under a pressure of 2 mm. from a 150-cc. Ladenburg fractionation flask. Five fractions were obtained, the first distilling from 160° to 163° and the fifth fraction from 180° to 190° C. The fractions were analyzed, and their composition was determined as previously described (J. Amer. Chem. Soc. 1924, 46, 775). The results given in Table II were calculated from the analytical data obtained.

TABLE II

Saturated Acids

Acids	Acids in Oil Per cent	Acids as Glycerides Per cent
Myristic	.04	.04
Palmitic	3.14	3.3
Stearic	1.82	1.9
Arachidic	.09	.1

The acids were recovered from some of the methyl ester fractions, and from the small undistilled residue, saponifying with alcoholic potash and decomposing the soaps with hydrochloric acid. The acids were collected and completely separated from the potassium chloride and the excess of hydrochloric acid which was used, by remelting them several times with water in the usual manner.

Palmitic, stearic, and arachidic acids were isolated from various fractions by fractional crystallization from alcohol. A small quantity of myristic acid was obtained from the acids of the first fraction. The arachidic acid was obtained from the fatty acids of the last (V) fraction, as well as from the undistilled ester residue. The identity of the acids was established by their melting points and by observing whether or not these melting points were lowered when the acids were mixed with equal quantities of the respective acids, which they were suspected of being, the purity of which had previously been established by elementary analysis. No depression of the melting point was observed in any case.

Summary

THE chemical and physical characteristics of a sample of expressed pecan oil have been determined. The composition of a pecan oil, which had an iodine number of 100 and a saponification value of 190, has been determined with the following results:

Glycerides of	Per cent
Oleic acid	77.8
Linolic acid	15.8
Myristic acid	trace
Palmitic acid	3.3
Stearic acid	1.9
Arachidic acid	.1
Unsaponifiable matter	.35

Lehman Johnson 1862-1929

WE regret to announce the death, suddenly, on September 23, of Edwin Lehman Johnson, of Memphis, Tennessee, Oil Mill Chemist and Engineer, and Charter Member of the American Oil Chemists' Society.

Mr. Johnson was found with his neck broken, in the wreck of his automobile, which was overturned in a deep ditch a few miles south of Tunica, Mississippi. He was returning to Memphis from a visit to several oil mill clients in the Delta section.

At the funeral services in Memphis, September 25, in addition to members of his family many sorrowing friends were in attendance including oil mill officials, managers and superintendents; city officials, members of civic clubs, clergymen and business men generally. Among the floral tributes was a large wreath from the National Cottonseed Products Association.

Lehman Johnson was born in Memphis in 1862. His father, the late J. C. Johnson, was a pioneer cottonseed crusher, operating the Hope Oil Mill in Memphis in the early eighties. Lehman was a graduate of Southwestern University, then the Presbyterian University at Clarksville, and of Brown University at Providence, R. I. He received his Ph.B. degree at Brown. He also took a course at Clemson Agricultural College in South Carolina, and for a time was a member of the faculty. Following some years of association with his father in the Hope Mill, during the period of intense development of oil milling processes and the utility of cottonseed products, he established the Johnson Commercial Laboratories, and began his long life of service to the industry as a chemist and operating specialist.

His loss will be felt keenly by his many friends of the American Oil Chemists' Society.

Cook, Swan Pays 100 Percent

MARK W. MACLAY, the Federal Court's receiver in the case of the Cook, Swan and Young Corporation, has announced that every creditor of this large fish and vegetable oil refining and dealing company is being paid 100 percent of his claims, plus interest. Furthermore, after the payment of all claims and the major portion of the receivership expense, there remains on hand a sum of approximately $75,000. This unusually successful windup of the affairs of an embarrassed company was considered by the receiver as a most convincing argument in favor of equity actions in receiverships as opposed to bankruptcy proceedings.

Glycerine Used to Reclaim China Wood Oil

By Edward Steinhoff

FOR years varnish makers held tenaciously to that secrecy which at one time enveloped practically all chemical industries. But now even the "sanctum" of the "expert" and practical varnish maker has been entered by science. Old fashioned empirical formulae without scientific bases and the secret methods of the old time varnish maker are giving ground to chemical principles based on scientific studies. Among the so-called "secrets" which have been guarded by some experts is the method of reclaiming china wood oil with glycerine.

In this article it is the purpose to give a simple yet effective means for reclaiming a batch of china wood oil that has congealed to a solid mass or is about to become solid. For simplicity let us consider a long oil china wood oil varnish having the following formula:

Rosin	100 lbs.
China wood oil	40 gals.
Lead and manganese	10 lbs.
Naphtha	80 gals.

To produce a spar varnish according to this formula load the kettle with 50 pounds of the rosin and 40 gallons of china wood oil. Run temperature to 450 degrees F., allow to gain 575 degrees, add the lead and manganese driers and then the remainder of the rosin. Cool and reduce with naphtha. Note: Watch for jellying.

China wood oil possesses the peculiar characteristic of congealing when heated above 450 degrees F. and therefore special care must be exercised when heating this oil to prevent such an occurrence.

The combination of rosin with china wood oil in definite proportions together with driers and thinners makes an excellent spar varnish and as a matter of fact many of the modern varnish formulae resemble the above formula.

Due to the civil wars and general unstable conditions in China shipments are uncertain and the quality of the oil from shipment to shipment quite often varies.

Although specifications are closely watched in the chemical laboratory, the congealing factor of this oil is not always determined by the chemist as the varnish maker finds it desirable in actual practice. Shipments as tested by the chemist are accepted or rejected in accordance with specifications; and as few chemists are experienced varnish makers a slight variance in jellying time is not usually considered of significance. However, a few seconds in the laboratory test with five cubic centimeters of oil may account for an hour or more difference in a large kettle batch. It may be well to add here that a closer cooperation between the varnish maker and chemist, more especially in respect to such a test as this, would be of great help to each.

In quantity production of varnish, one is often so pressed for time that it is difficult to watch each batch closely. A batch of china wood oil often congeals under these circumstances. There is then a natural propensity to use a bucket of rosin, varnish maker's linseed oil or whatever reclaimer may be at hand to "catch" the batch and "bring it back." There are quite a number of materials and combinations of materials that may be used for this purpose, among them being rosin, linseed oil, litharge, red lead, lead acetate, semi drying oils, etc.

Although the above mentioned materials may perform the desired function, they are not the most economical and satisfactory, for inasmuch as there is such a large difference in the physical properties of the finished product due to the large quantities of "reclaimers" added it may become necessary to use it for some other purpose than that for which the product was originally intended.

Glycerine may be used if the batch is either cold and solid or has just started to congeal and cannot be thinned by ordinary methods. In case the batch is cold and solid, add one gallon of glycerine to each 60 gallons of china wood oil, pouring the entire gallon into the kettle—heat slowly and watch for frothing. Have five pounds

(*Turn to Page* 43)

A Lard Trade Mark Disputed

What Limits Confusion With a Neighboring Product As Illustrated in the Purola Trade Mark Case?

By Waldon Fawcett

THE industry has to thank one of its members for vindication of a branding right that has long been in jeopardy, or at least, in doubt. The Vegetable Oil Products Company was, of course, serving its own ends in fighting for special and particular recognition for oil and fat products. But, at the same time, or incidentally, it did a valuable service for the trade at large. This vegetable oil concern is responsible for an object lesson that is destined to stand as an epoch-marker and pace-setter.

It is not easy to tell, in a single sentence, all that the "Purola" case has done for the community of oil and fat producers. This is because the question which is answered by the decision in this test case is a complex one. Broadly, it might be phrased thus: What is the market span of an oil or fat trade-mark? When are oil and fat products akin to other commodities? Or, where are the boundary lines between the oil and fat group and its neighbors on either side?

To realize why this question of brand-range is so important, it is necessary for the reader to bear in mind that bound up with this element is the very essence of trade mark rights. Our American trade mark system, insofar as it is controlled or supervised by the Federal Government, is organized on this basis—a basis of limited or restricted jurisdictions. There is no such thing, under the law, as a universal property right in a brand. No brander, even if he is the first to hit upon a novel scheme of goods identification, can monopolize that idea, as such, in its application to every and all kinds of merchandise.

For purposes of trade mark administration, the Government has broken up or subdivided the mass of brandable commodities into groups or classifications—some fifty in all. When the Government, in effect, grants a trade mark franchise, by registering the mark at the U. S. Patent Office, it grants what might be described as a sectional license. The registrant obtains Federal recognition of the fact that he is entitled to a monopoly of use of his trade mark within his zone of operations or within the scope of his commodity line. This registration at Washington vindicates the pioneer's right to use the mark not only upon the wares first put out under the brand but likewise upon related products, the inclusion of which within the original line would constitute a normal extension or logical expansion of the business.

The boundaries of a marketer's trade mark domain are mighty important to him under any circumstances. But this importance is sharpened when, under the U. S. trade mark rules, ownership of a trade mark in one commodity corridor leaves other parties free to lawfully use the same or very similar trade marks in other commodity lanes. Even the fact that a trail-blazer has invented a trade mark device or coined a trade-mark name does not prevent other traders from borrowing the idea without permission if they operate in more or less distant commodity areas. It is a case where, literally "over the fence is out."

With the whole commodity map thus broken up, for trade mark purposes, into sectors, it follows that every user of brands is due to be tremendously concerned as to just where his group boundaries are. How close may he go to the other fellow who is sharing his mark in a different environment? Or, how close may the other fellow come to him? This is precisely the momentous question which has been at stake in the "Purola" case. The reader will readily realize too that, while the instant case might seem to concern only one firm in the trade, the principle of oil and fat jurisdiction vitally affects every last member of the industry that has brands in his keeping or that ever expects to have brands. Because,

brands gain in value as good will grows and an owner cannot know too much about the dimensions and the right-of-way of his most valuable intangible asset.

Rationing of Trade Marks

BEFORE seeing how the system of Governmental rationing of trade marks is actually working out in oil and fat circles, perhaps it were well to pause for just a moment to explain how the Government lays out the boundaries it sets between commodity classifications. This is not done arbitrarily or in hit and miss fashion. The main subdivisions are, to be sure, just naturally dictated by the variances in the physical character of commodities. Thus, it is all but inevitable that Foods and Ingredients of Foods should constitute one grand division. But when it comes to subdividing, the Department of Commerce has provided itself with a novel yet thoroughly practical measuring stick.

This diviner of commodity boundaries is nothing less than that state of commercial being known as "confusion in trade." The rule is that if there is "confusion" as between two articles of commerce or two lines of goods, the respective offerings are too close to one another to permit the same or very similar trade marks to be used by two parties in the neighboring communities. If, on the other hand, it appears that there is no danger of "confusion," the Federal umpires may be expected to rule that there is no harm in permitting parallel branding in the two lanes.

In the case of specialties such as oil and fat products, which are surrounded by commodities that are near or distant relatives, the determination of when and where there is danger of trade confusion is a mighty ticklish task. The Federal censors have to put themselves in the places of average everyday consumers in order to guess whether the rank and file of citizens would be likely to be deceived or to mistake one article for another under a duplicate brand or near-duplicate. It is difficult enough to determine when there is risk of substitution of goods because of brand repetitions. It is even harder to appraise the dangers of "confusion of reputation"—the chance that old customers will accept a new article under a familiar brand in the belief that it was manufactured by the same firm that made the trade mark famous, when, as a matter of fact it comes from another factory.

Protests Not Unethical

IT IS only human nature that every owner of a trade mark should strive to establish the widest possible swath for his trade mark. For selfish but wholly natural reasons, he likes to hold other users of his mark as far off as possible or, if possible, to prevent their participation entirely. This attitude has been clearly illustrated by the episode which has just made news for the oil and fat industries. The Vegetable Oil Products Company had no sooner sought to register its mark "Purola" than vigorous objection was raised, before the Patent Office tribunals by the Pure Oil Company.

There was nothing irregular or unethical in the lodging of a protest. Any person who deems that he would be injured by the registration to another of a coveted trade mark is empowered by law to rise and object. What gave zest to the current case was the length to which the opposition was carried. The Vegetable Oil Products Company uses its trade mark upon hard fat shortening, a lard substitute. The Pure Oil Company had already registered the same trade mark but for use on lubricating oils and greases, motor fuel oils and miscellaneous lubricants.

Perhaps a member of the oil and fat industries who was given to splitting hairs in differentiating between classes of goods might instantly come to the conclusion finally arrived at by the Federal umpires—viz the radical disparity between a food product and a line of products not for internal use. But, if one pauses for reflection it is seen that there was at least the shadow of an excuse for "fighting it out" as was done. To many minds, the name "Purola" might suggest the idea of "pure oil," without any definite preconception as to just what kind of oil was referred to. And the word "Oil" is a prominent feature of the corporate name of each of the concerns sharing the mark. The Pure Oil Company has other trade marks, such as "Puro," "Pured" and "Purolene," and the conclusion was inescapable that it resented any other user, over a wide commercial horizon, capitalizing the idea of "pure" in abbreviation.

Worth of Priority

ADMINISTRATORS of the governmental clearing house for trade marks are always prone to give the benefit of the doubt to the old-established house as against a

(*Turn to Page* 43)

Oil Chemists' Fall Meeting in New York

Third Annual Autumn Gathering to be Held Under Auspices of Soap Section

Hotel McAlpin, New York
Where Fall Meeting of A. O. C. S. will be held.

PRESIDENT W. R. Stryker and the Governing Board of The American Oil Chemists' Society announce that the Third Annual Fall Meeting will be held at the McAlpin Hotel in New York City, on Thursday and Friday, the 14th and 15th of November, 1929.

The Meeting will be directly under the auspices of the Soap Section of the Society of which A. K. Church, Vice-President of the Society, is Chairman. The sessions will be devoted to the reading of many interesting papers on oil chemistry, with particular reference to its bearing on the manufacture of soaps and allied products.

There will also be addresses by prominent chemists from outside the membership of the Society, dealing with the general progress of chemistry and its industrial applications.

In addition to the business sessions of the meeting, there will be opportunities for members who attend to visit industrial plants in the New York district, where some of the largest oil refineries and soap manufactories are located.

The mornings will be devoted to the general sessions of the Meeting and the afternoons to committee meetings, and visits to industrial plants.

There will be meetings of the Governing Board of the Society and of the Joint Committee on Fat Analysis of The American Chemical Society and The American Oil Chemists' Society, held at some time during the course of the Convention.

A new feature of the Meeting this year will be a series of exhibits by leading manufacturers of chemical apparatus and glassware, which will enable the visiting members and guests to inspect examples of the very latest developments in the accessories of their profession.

The entertainment features will include a Get-together Luncheon and a Banquet, at which the Society's able Toastmaster, David Wesson, will preside.

The New York Committee of Arrangements in charge of the Meeting consists of H. P. Trevithick, *Chairman,* David Wesson, W. A. Peterson, R. W. Bailey, and A. P. Lee.

All chemists who are engaged in work relating to oils and fats or soap are cordially invited to attend the Meeting, whether or not they are at present affiliated with the Society.

The program will be announced in full in the November issue of *Oil & Fat Industries.*

Notes of the Industry

New Copra Plant on Coast

A COPRA-PRESSING PLANT, to cost $250,000, is under construction on Mormon Island in Los Angeles harbor for the Copra Oil & Meal Company, Ltd., a subsidiary of the Los Angeles Soap Company. The plant will be ready for operation in November and is designed to handle 30,000 tons annually. It is the first pressing plant at the port.

The plant covers three acres and comprises eight steel storage tanks each 40 feet in diameter and as high; a mill building 40 by 180 feet and four tanks 22 by 17 feet to hold fourteen carloads of coconut oil.

The oil is all for the Los Angeles Soap Company. The meal will go into dairy feed. Philippine copra will be used.

African Palm Oil Interests Merge

MARGARINE UNION, LTD., and the United Africa Company have reached an agreement for the merging of the West African interests of the two companies. The new step follows the recent large merger of Lever Brothers and the Margarine Union. The United Africa Company was formed May 1 from the amalgamation of the Niger Company, controlled by Lever Brothers, Ltd., and the African & Eastern Trade Corporation.

By the terms of the new merger, Margarine Union's West African interests will be transferred to the United Africa Company and Margarine Union will become a holder of a substantial block of new shares in the United Africa Company. The move involves an increase in the capital of the United Africa Company, at present £14,000,000.

The merger will become formally effective January 1.

Colored Shortening Taxable

BEGINNING October 1, 1929, the Government will collect the Federal oleomargarin taxes on artificially colored cooking compounds and nut shortenings, according to R. A. Maars, assistant commissioner of internal revenue. Mr. Maars recently addressed a group of manufacturers of such products assembled at his invitation to discuss the tax question.

The United States District Court in St. Louis, in a case brought by the Harrow-Taylor Butter Company, upheld the Bureau of Internal Revenue in collecting taxes against such products made in semblance of butter, and while it is possible that an appeal may be taken with a chance of a reversal in ruling, the bureau has decided to proceed to collect the taxes at once.

Mr. Maars met the manufacturers separately and privately in an effort to reach a decision as to whether the bureau would attempt to collect back taxes and penalties for manufacture of colored shortenings in the past and if so on what basis it would proceed. The outcome of these conferences was not made public, and no announcement has been made regarding back taxes.

Margarin Output in July

ACTUAL production of margarin in the United States in July was 24,873,001 pounds, an increase over July a year ago, when the total was 21,443,933 pounds, according to production figures reported by manufacturers to the Bureau of Internal Revenue.

Of this output, 23,644,494 pounds were uncolored margarin and 1,228,507 pounds colored margarin, compared with 20,434,798 pounds of uncolored and 1,009,135 pounds of colored margarin produced in July, 1928.

The Interstate Commerce Commission has suspended for six months, pending investigation, a proposed revision of freight rates on cottonseed cake, meal, hulls and related articles from points of origin south of the Ohio River, mostly in Mississippi Valley territory, to destinations north of the Ohio River, dockets I. & S. 3354.

British Columbia Fish Products

PRODUCTION of fish oil and meal in British Columbia showed a large increase in 1928 over previous years, according to figures given in the report of the Commissioner of Fisheries and forwarded to the Department of Commerce by the trade commissioner at Vancouver. The twenty-three

reduction plants on the west coast of Vancouver Island are credited with a production of 4,035,879 gallons of oil and 34,227,200 pounds of meal. Of this total, 3,997,656 gallons of oil and 32,484,480 pounds of meal were extracted from pilchards, the remainder from herring.

The reduction plants in 1928 handled 183,097,600 pounds of fresh-caught pilchards, from which they extracted an average of 48.6 gallons of oil and 36 pounds of meal per long ton. A total of 4,135,040 pounds of fresh-caught herrings were also used, with an average yield of 19.9 gallons of oil and 38 pounds of meal for each ton of fresh fish handled.

Statistics of exports to the United States, as supplied by the Chief Supervisor of Fisheries, show smaller quantities than given, as an estimate, in a previous report, the totals being 1,367,638 gallons of oil and 26,107,200 pounds of meal in 1928.

Officials Attack Trade Code

AT A recent meeting in Memphis, agricultural commissioners from ten Southern States adopted a resolution asking for an investigation by the Federal Trade Commission of the activities of cottonseed crushers under the recently adopted Code of Ethics.

According to the resolution, prior to the adoption of the code, cottonseed was purchased by the mills on a competitive basis, but since that time, although prices have varied in different States, they have not varied in individual States. It was also stated in the resolution that the code was approved by the Federal commission over the protests of the agricultural commissioners of Georgia and Alabama. Elimination from the code of a prohibition against the exchanging of cottonseed for meal at the mills was also asked.

F. M. Biffen, Chemist for ten years with the British Government Laboratories, has taken a position in the laboratories of Foster Dee Smell, Brooklyn, N. Y.

Procter & Gamble Co., Cincinnati, announce the election of Frank E. Goodlander as a director to represent employee interests.

New P. & G. Chemical Library

Ivorydale's Chemical Library

The Chemical Division of the Procter and Gamble Company has recently occupied new library quarters on the top floor of the Chemical Division building at Ivorydale, Ohio, according to "Moonbeams," the House Organ of the company.

Every book of importance on fats and oils, whether written in English, French or German, is to be found on the shelves of this library, besides all the journals bearing on these subjects. The two librarians in charge have Doctor's degrees and were selected because of their familiarity with the various topics covered by the library.

The service rendered by the library is in keeping with the policy of the Procter and Gamble Company to provide the proper scientific background for the research work of the company's engineers and chemists, and to furnish a fund of general information, not only for the research workers, but for those who are active in the company's production operations as well.

The Glidden Company has purchased the business of E. R. Durkee & Co., of New York, manufacturers of salad dressings and condiments, and also the Benchley Margarin Company of Oakland, California. The latter company will be consolidated with the Glidden Food Products Company at Berkeley.

Otto Eisenschiml, of the Scientific Oil Compounding Company, Chicago, recently returned from an extended European trip.

Fred A. Jenson has been elected president of the Chicago Paint, Oil and Varnish Golf Club.

An order has been signed by the Governor of Barbados, B. W. I., prohibiting the importation of cottonseed meal after August 29, 1929, according to a despatch received from the American Consul in Barbados. No reason for the ban is given in the despatch.

British Margarine Merger

A MERGER has been effected between Lever Bros., the large soap manufacturers, who already had been extensively engaged in the refining of coconut oil and other oils and the manufacture of margarine, with the Margarine Union, the British branch of the Dutch-English margarine combination, Margarine Unie, which, for several years past has dominated trade of Europe. Shares of the two companies will be amalgamated from January 1, 1930, on the basis of an equality status. The amount of capital involved, and the world-wide ramifications of the two companies both contribute to make this one of the largest fusions in modern British industrial history. Margarine Union, in addition to its manufacturing operations, controls large distributing interests in England, including Lipton's Stores. It is believed that the merger will be accomplished by the formation of a holding company to take over the ordinary shares of Lever Bros., Ltd., issue its own shares, and acquire the share capital of Margarine Union and Margarine Unie. The total amount of capital involved in the transaction is over $350,000,000.

Union and Levers is to be the name of the new company. The capital of the Margarine Union is to be increased and the voting rights of the shares involved in the transaction will be vested in the new company.

An edible fat and a lubricating grease are sufficiently unlike so that the same trademark may be used on both, it was ruled by W. A. Kinnan, Assistant Commissioner of Patents, in a controversy between the Pure Oil Company, Chicago, and the Vegetable Oil Products Company, Los Angeles.

The Los Angeles concern sought registration of the word, "Purola," on a product first described as "edible hydrogenated fish oil" and later changed to "hard fat shortening." The Pure Oil Company objected that it had previously used this and similar marks on lubricating oils and greases. Mr. Kinnan said:

"It is deemed that the commercial activities of the respective parties are so dissimilar as to the nature of the goods, the class of purchasers, and the uses for which the goods are intended that there is no probability of confusion in trade."

Urges Duty on Philippine Products

A proposed amendment to the Tariff Bill, which would hold all Philippine products dutiable at the full rate of duty, has been introduced by Senator Broussard, of Louisiana. At the same time Senator Broussard introduced a resolution calling for the independence of the Philippine Islands. The Senator's proposed amendment to the Tariff Bill provides that the full amount of duties collected on Philippine produce shall be rebated by the United States Treasury to the Philippine Treasury for the education and development of the Filipinos, in order to hasten the day on which they will be fitted for self-government. In explaining his proposal, Senator Broussard said: "Of course, this plan is only intended to apply until we give the islands their independence." He believes there is considerable sentiment in this country for his idea and that there is a fair chance of its ultimate adoption.

Lower freight rates on carload shipments of linseed oil to Southern points are asked in two complaints filed with the Interstate Commerce Commission by the Archer-Daniels-Midland Company, Chicago. Present rates from Chicago of 80 cents per 100 pounds to Birmingham and 62 cents to Nashville should be reduced to 61 cents and 45 cents, respectively, it is declared, while rates from Buffalo of 98 cents to Atlanta, 85 cents to Birmingham and 63½ cents to Nashville should be reduced to 74 cents, 69½ cents and 55½ cents, respectively.

The Davison Chemical Company, whose primary products are sulphuric acid and superphosphate, has acquired a controlling interest in the Fremont Cotton Oil Company, Goldsboro, N. C. The acquisition was made through the Eastern Cotton Oil Company, a Davison subsidiary. It is understood that the interest of the Davison Chemical Company in the Fremont company comprises 60 per cent of the stock. The purchase price is said to have been $75 a share. The par value is $50.

John W. Kellerman, treasurer of Isaac Winkler & Bros. Co., Cincinnati, died at his home in Kennedy Heights, recently, after a heart attack. He had been associated with Isaac Winkler & Bros. for twenty years.

New Continuous Extraction Plant

It is reported that a large feed company in the Middle West is installing the first unit of a continuous extraction plant for degreasing previously dried garbage meal. The continuous extractor operates with a steady stream of the material to be extracted entering the machinery at one end and constant discharges of dry extracted meal and of solvent-grease mixture leaving at separate outlet points. The entire process is conducted under vacuum, the solvent being recovered from the solvent-grease mixture by distillation at approximately 5″ absolute pressure (mercury gauge). The still is of a special vertical film type. The solvent used is a petroleum distillate of 105-210° F. boiling point range, which has been freed of all heavy ends and of sulfur compounds. It is said to impart no odor or taste to grease or residue meal.

McPherson President of A. C. S.

PROFESSOR William McPherson, Dean of the Department of Chemistry of Ohio State University, will be President of the American Chemical Society for 1930, as a result of a special election. Dean McPherson, who will succeed Dr. Irving Langmuir, was named by ballot of the council of the society. Professor McPherson has been a member of the Ohio State chemistry faculty since 1892, rising to a full professorship in 1897, and to the leadership of the Graduate School in 1911. He was acting president of the university in 1924. He is a fellow of the American Association for the Advancement of Science and served as a lieutenant-colonel in the chemical warfare service during 1918-1919.

Continental Can Acquires Gille

The Continental Can Company has purchased the assets and business of the Gille Manufacturing Co., of Kansas City, manufacturers of tinplate containers for lard, oil, and other products. The property includes a large modern plant in the business district of Kansas City, equipped with railroad facilities.

This unit is intended by the Continental to form an important link in its chain of can factories which now extends from coast to coast, the company previously having had no factory between Denver and Chicago. Harry S. Gille has been appointed manager of the plant for the Continental company and other members of the Gille organization will continue under the new ownership in the same positions they have heretofore occupied.

New Books

Bibliography of Bibliographies on Chemistry and Chemical Technology: by Clarence J. West and D. D. Berolzheimer; First Supplement—1924-1928; published by The National Research Council, Washington, D. C. In this supplement to their previous work in the same field, the authors have brought the list of references down to a more recent date, and besides thoroughly covering the field of the original publication, have added many new subjects. The volume, used in connection with the first issue to which it is a supplement, will prove a useful condensed reference work in the field of chemistry and its applications.

The Bureau of Fisheries will publish shortly a document entitled "Bibliography on cod-liver oil in animal fooding with non-critical comments and abstracts" by John Ruel Manning, associate technologist of the United States Bureau of Fisheries. When issued, this publication may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a very nominal price; and in quantity it may be secured at a reduced rate.

This document should be of interest not only to persons in the fishery industries and producers of cod-liver oil, but also to biochemists and other research workers in this field, and to animal feeders and those interested in animal nutrition in general. It contains as complete a bibliography as could be assembled, together with non-critical comments and abstracts of the references contained therein. These general nutritive and therapeutic properties of cod-liver oil are discussed in detail. The results of experimental feeding of farm animals, as well as the work done with laboratory animals, are included in this document. The manner of administration, the dosages in practical feeding recommended by the best authorities, and many other principles of practice of vital interest to the farmer are set forth.

The Union Oil Mill at Hubbard, Tex., started its new season's crush with largely increased facilities, including a 65x90 ft. addition to its seed house, an extension of its main building, and much new machinery.

ABSTRACTS

David Wesson, *Abstract Editor*

The progress of the drying of raw linseed oil and of boiled oil prepared with manganese or cobalt driers has been studied by means of the Wolff "spreading drop" method. For normal thickness of film the rate of drying was found proportional to the gain in weight. With cobalt drier the drying at the beginning proceeded faster than the gain in weight. For thicker film, there was a loss in weight at the beginning, although the drying proceeded in the normal manner. *Farben-Ztg.* 34, 2069-72 (1929).

Hydrogenated sunflower seed oil is said to contain forty-five percent of iso-oleic acid. It is claimed that the presence of various isomers of oleic acid in such hydrogenated sunflower oil makes the material more suitable for the manufacture of soap. *Maslob. Zhirov. Delo* 1927, No. 1,23-7.

A newly-patented vitamin-containing food product is prepared by treating a vitamin-bearing fatty material such as fish-liver oil with an alkaline earth hydroxide; pulverizing the water-soluble soap thus obtained, and extracting the vitamins from the soap by the use of an edible fat, such as cottonseed oil. U. S. Pat. No. 1,715,945.

A patent recently granted in England to a German company claims that active carbon of high absorptive power and mechanical strength is obtained by heating fine-pore vegetable materials such as plum stones, coconut shells, and other hard shells, which are broken up into small pieces, with a concentrated solution of zinc chloride, the weight of zinc chloride employed being less than that of the vegetable material treated.

Colorless condensation resins are prepared from glycerol and phthalic anhydride by effecting the initial reaction at a temperature not exceeding 175° C. and heating the product at a temperature not exceeding 100° C. until it has attained a rubbery consistency, then hardening at a temperature not exceeding 135° C. —Brit. Pat. No. 300,668.

A critical investigation of the conduct of the titer determination of fatty acids has shown that the test should be carried out in a tube of 26-30 mm. diameter, as a tube of 14 mm. in diameter gives results about 0.8° too low; the presence of a trace of water may lower the result about 1°; allowing the acids to cool without stirring with the thermometer introduces an error of about -5°.—*Chimie & Industrie* Special No. 521-2 (Feb., 1929).

It is said that the rancidity of coconut oil can be entirely removed by simple agitation with clay, by boiling with an aqueous colloidal suspension of clay, or by treating with superheated steam under reduced pressure in the presence of clay. — *J. Am. Phar. Assoc.* 18, 491-3 (1929).

From examination of the determination of saponification numbers on oils and fats in experiments on tallow and vegetable oils, it is concluded that no error is introduced because of the strength of the alcohol, provided it does not fall below 45-50 percent at the end of the titration; that saponification is generally complete in fifteen minutes and thirty minutes is ample for all ordinary purposes; and that a 3 gram sample should preferably be taken, 5 grams giving a less sharp end point. It is recommended that the acid (generally 0.5 N hydrochloric), should be standardized directly against c.p. sodium carbonate and that determinations be made in duplicate.—*Chimie & Industrie* Special Number, 525-6 (Feb., 1929).

A new fatty acid has been identified in montan wax. The procedure involved saponification of the wax with an aqueous solution of potassium hydroxide under pressure, extraction of unsaponified and unsaponifiable material with benzol, liberation of the acids and their conversion into the corresponding methyl esters. These methyl esters were fractionated under 5 mm. pressure. The fractions were then saponified and the acids fractionally pre-

cipitated. Besides fatty acids C_{25}, C_{27}, and C_{29}, previously found, an acid $C_{31}H_{62}O_2$ was identified. Its amount was 4.7 percent of the total acids present. The acid $C_{30}H_{60}O_2$ was not present in the sample of wax used for this examination. *Brennstoff-Chem.* 10, 82-6(1929).

The preferential demand in Europe for Polish linseed oil in preference to the Argentine seed has been explained on the basis of the experiment of Ivanov, who concluded that the chemical composition of the oil changes markedly in relation to the climate in which the plant is grown. Ivanov contended that not only geographical latitude, but longitude and altitude as well, affect the content of unsaturated linkages in the oil. He maintained that iodine value increases in the South-North direction at the rate of about two units per degree of latitude for linseed oil, 0.65 units for rapeseed oil and 1.3 units for sunflower seed oil. Przemysl Chem. 13, 167-8(1929).

An apparatus and method for the determination of turbidity time numbers and solidifying points of solid fats, especially cacao butter, is described as follows: The apparatus used is a squatty flask with inlet and outlet for water and a tubulure for a thermometer. It carries in its neck a titer tube, 23 mm. in diameter and within this a 19 mm. titer tube and another thermometer; the 19 mm. tube has a vertical blue line 1 mm. wide, at its back. The flask is filled with water kept at 20°, and the space between the two titer tubes is filled with liquid petrolatum. Method: Neutralize 100 grams of cacao butter with 2 grams magnesium oxide, filter, remove the 19 mm. titer tube, place 10 cc. of the filtered cacao butter in it, heat to 50°, replace, stir with the thermometer until the blue line becomes invisible, using a 25 watt light in the background. The time interval in seconds between start and finish is noted by means of a stop watch. Continue the test without stirring and note the highest temperature reached by the thermometer. The time interval between the turbidity point and the highest temperature point is expressed in minutes. In some cases different results are obtained; the test is then immediately repeated. Results are tabulated for various cacao butters, varying in turbidity point between 510 seconds for pure, pressed cacao butter and 1140 seconds for dark, hull-extracted cacao butter, and between 75 minutes and 265 minutes in the titer time in the first test. The second determination varied between 450 and 1020 seconds and 66 and 233 minutes respectively. American lard (second test) showed 360 seconds for turbidity and 8 minutes for titer; tallow 75 second and 1¼ minutes; hardened fish oil 90 seconds and 1½ minutes and hardened coconut oil 330 seconds and 9 minutes. *Chem. Umschau Fette, Oele, Waschse u. Harze* 36, 165-7 (1929).

In treatment of material by dry rendering, to produce cracklings which are substantially water-free and which are separated by draining from rendered fat, the heated separated cracklings are subjected to the action of hot vapor to promote the extraction of their fat content, under pressure and temperature conditions which are substantially inhibitive of condensation of the vapors in the presence of the cracklings. U. S. Pat. 1,722,015.

A newly described process for the production of sulfonated oils comprises the sulfonation of animal or vegetable oils or fatty acids or hydrocarbons, oils or mineral waxes in the presence of oxidizing or reducing bleaching agents and the application of a subsequent bleaching treatment, either before or after neutralization. As bleaching agents, sulfites, hyposulfites, persalts or hydrogen peroxide may be used. Fr. Pat. No. 658,094.

Fats, oils or fatty acids are treated with alkali hypochlorites in the presence of a mineral or organic acid, and the products thus modified are treated with alkali hypochlorites or hypobromites either alone or in the presence of specified organic compounds. Fr. Pat. No. 33,131, addition to No. 633,922.

The extraction of fat from cacao powder or similar extractions may be accomplished in an apparatus in which a solvent such as benzol is caused to flow upwardly by displacement through a zone in which it is agitated with the cacao powder or other material to be extracted and through a second zone where it is permitted to become relatively quiescent so that material in the latter zone acts as a filter for the solvent. U. S. Pat. No. 1,721,858.

Market Report on

FATS, OILS AND GREASES

(*As of October* 1, 1929)

NEW YORK—Prices of oils, fats and greases were again on the rise during the period just closed after the period of declining prices which closed a month ago. Linseed oil led the market by advancing phenomenally. The government crop estimate reported that an even smaller flax crop than had been anticipated would result. This gave strength to the whole market structure leading to an advance in the price of chinawood which was sufficiently strong without this added firmness. Grease continued to rise, as demand both here and abroad continued good. Tallow also rose as offerings continued light. Corn oil scored an advance as a result of shortage of stocks. Reports from producing areas indicated that the crop of cottonseed oil would be reduced by unfavorable weather conditions. Other advances were recorded in neatsfoot oil, lard oil and oleo oil. Coconut oil and lard were quoted lower.

Chinawood Oil

Chinawood oil continued very firm with quotations higher all along the line than was the case last period. Supplies were light, demand was strong and political conditions in China were no more promising than they have been in recent months. Coast tanks sold at 14½c lb., with spot stocks 1c lb. higher in barrels or drums.

Coconut Oil

There was no change in the spot price of coconut oil, as compared with a month ago, but coast shipments were quoted lower. Toward the close of the period the price of copra firmed up, strengthening the market for coconut oil.

Corn Oil

Prices on crude corn oil were higher at the close of the recent period. New buying interest was shown, and this, coupled with shortness of stocks, served to raise the schedule.

Cottonseed Oil

Quotations were resumed again on crude cottonseed oil, and the closing figures were 7⅝ to 7¾c lb. for oil in tanks at the mill. Sales were in small volume with price changes confined within small limits. News from producing areas gave no very definite information as to crop expectation, although it was certain that unfavorable weather had affected the crop adversely to some extent.

Grease

Grease continued its recent upward movement, as export demand continued good and domestic inquiry also held out well. Quotations on yellow and house grease were 7⅜c to 7½c lb., with brown grease ⅛c lower.

Lard

Several small declines were noted in lard prices during the period. Demand was fair but irregular. Lard oil rose ½c lb. for all grades.

Linseed Oil

A violent rise in price of linseed oil greeted the government estimate of the linseed crop as of September 1st. The report predicted a yield of 16,388,000 bushels, as compared with 18,690,000 bushels during the 1928 season. Quotations rose abruptly, and at one time tanks were quoted as high as 16c lb., with the rest of the list correspondingly high. Few sales were reported at this level, as consumers waited for the market to settle down. Declines were noted through the rest of the period which closed with the schedule still 3⅜c lb. above the closing prices for last period.

Olive Oil

With a normal production of olive oil expected from the European market, and a better demand materializing in the domestic market, few changes were noted in the price of this oil. Spot stocks were available from $1.00 to $1.10 gal., with futures quoted slightly lower. Foots sold at 8¾c to 9¼c lb.

Tallow

Offerings of tallow from producers were light, and in spite of lessened demand, tallow prices rose considerably. Edible tallow was offered at 9½c to 9¾c lb., ½c lb. above the closing price of last period.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of			
40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing			
36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing			
36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.15½	.16
Coast, tanks, spot	lb.	.14½	.14¾
Futures	lb.	.14¼	.14⅜
Coconut, Ceylon grade, bbls.	lb.	—	.08⅛
Coast, tanks	lb.	.06⅝	.06¾
Cochin grade, bbls.	lb.	.08⅝	.08⅞
Manila, bbls.	lb.	—	.08
Tanks, N. Y.	lb.	.07	—
Coast, tanks	lb.	.06⅝	.06¾
Fatty acids, mill, tanks	lb.	—	.1 ½
Cod, Newfoundland, bbls.	gal.	.61	.62
Copra, bags, coast	lb.	.04½	—
Corn, tanks, mills	lb.	.08⅜	.08½
Bbls., New York	lb.	.09½	—
Refined, bbls.	lb.	.10½	—
Fatty acid	lb.	.08¾	—
Cottonseed, crude, tanks, mill	lb.	.07⅝	.07¾
P. S. Y.	lb.	.09	—
Fatty acids, mill, bbls.	lb.	.09	—
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.05	.05¼
German, bbls.	lb.	.03½	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bbls.	lb.	.06½	.07
Creases, choice white, bbl. N. Y.	lb.	.09	.10
Yellow	lb.	.07⅜	.07½
Brown	lb.	.07¼	.07⅜
House	lb.	.07⅜	.07½
Bone Naptha	lb.	.06¾	—
Herring, coast tanks	gal.	.40	nom.
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.12	—
Compound, tierces	lb.	.11¼	.11½
Middle Western, tierces	lb.	.12¼	—
Neutral, tierces	lb.	—	.14
Prime Western, tierces	lb.	.12¼	—
Lard oil, No. 1, bbls.	lb.	.11¾	—
No. 2, bbls.	lb.	.11½	—
Extra bbls.	lb.	.12½	—
No. 1, bbls.	lb.	.12	—
Winter strained, bbls.	lb.	.12¾	—
Prime, bbls.	lb.	.15¼	—
Linseed Oil, boiled, tanks	lb.	.1590	—
Car lots, bbls.	lb.	.1670	—
Less car lots, bbls.	lb.	.1710	—
Less than 5 bbls.	lb.	.1750	—
Double boiled, less than 5 bbls.	lb.	.1780	.1810
Raw, tanks	lb.	.1550	—
Car lots, bbls.	lb.	.1630	—
Less car lots, bbls.	lb.	.1670	—
Less than 5 bbls.	lb.	.1710	—
Calcutta, bbls.	lb.	.2200	—
Refined, bbls.	lb.	.1700	.1740
Varnish grades, bbls.	lb.	.1720	.1760
Linseed cake, bags	ton	50.00	51.00
Meal, bags	ton	58.00	59.00
Menhaden, crude, tanks, Baltimore	gal.	.47	—
Light pressed, bbls.	gal.	.67	.70
Yellow bleached, bbls.	gal.	.69	.72
White bleached, bbls.	gal.	.72	.75
Mustard, bbls.	gal.	.85	.90
Neatsfoot, cold pressed, bbls.	lb.	.18¼	—
Extra, bbls.	lb.	.12¼	—
No. 1, bbls.	lb.	.12	—
Pure, bbls.	lb.	.14½	—
Oleo, No. 1, bbls.	lb.	.11½	—
No. 2, bbls.	lb.	.10½	—
No. 3, bbls.	lb.	.10¼	—
Olive, denatured, bbls. N. Y.	gal.	1.00	1.10
Shipments	gal.	.97	1.00
Foots, bbls.	lb.	.08¾	.09½
Shipments	lb.	.08	.08½
Edible, bbls.	lb.	2. 0	2.30
Palm, Lagos, casks, spot	lb.	.07¾	.07⅞
Shipments	lb.	.07½	—
Niger, casks, spot	lb.	.07⅝	—
Shipments	lb.	.07⅜	—
Palm Kernel, pkgs.	lb.	.08¼	.08½
Tank cars	lb.	.07¾	—
Peanut, crude, bbls.	lb.	.11½	nom.
Mills, tanks	lb.	.03½	nom.
Refined, bbls.	lb.	.13¼	nom.
Perilla, bbls.	lb.	.16½	nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	.97	1.01
Refined, bbls.	lb.	.78	.80
Red Oil, distilled, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Saponified, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Salmon, coast, tanks	gal.	.44	nom.
Sardine, coast, tanks	gal.	.45	nom.
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13¼	.13½
Crude, bbls.	lb.	.11	.11½
Orient, coast, tanks	lb.	.09½	—
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15½	.16
Triple pressed, bags	lb.	.18	.18½
Stearine oleo, bbls.	lb.	.11	.11½
Tallow, edible, bbls.	lb.	.09½	.09¾
City, extra, works, loose	lb.	.08½	—
Special, works, loose	lb.	.08¼	—
Tallow oil, acidless, bbls.	lb.	.11	—
Tanks, N. Y.	lb.	.10¾	—
Vegetable tallow, coast, mats	lb.	.08	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Glycerine in Wood Oil

(*From Page* 31)

of litharge at hand to sprinkle onto the froth to bring it down. Whip down if necessary. Allow to cool and reduce with the usual amount of thinners. In the event the batch is still hot but too heavy in body to reduce the ordinary way, add one gallon of glycerine slowly and follow the same procedure. One gallon of glycerine and five pounds of litharge in 130 gallons of materials is comparatively speaking a small amount. The chemical reaction which takes place is the formation of an ester with the action of the glycerine on the rosin and china wood oil — a tri-glyceride being formed. The addition of the glycerine hardens the product and makes it more waterproof, while the litharge makes it dry a little faster. The increase in quantity may be considered negligible while the quality if anything has been bettered.

—*Paint Oil & Chem. Review.*

Rendering Deodorizer

(*From Page* 20)

in preparation for further operations with a minimum loss of time and maximum use of the deodorizer. Ordinary city pressure was found to be sufficient in the water feed for the spray nozzles.

THERE are one or two additional details that might be mentioned in closing. In feeding shop fat to the melters, the removal of the charging hole cover is frequently the opportunity for releasing considerable quantities of ill-smelling odors. If, however, a hopper of sheet metal which just fits the charging hole is kept well filled with fat, additional fat can be charged into the melter without the gases escaping into the factory through this opening. As a new barrel of fat is dumped into the hopper, a workman can move some of that below into the melter with a shovel always keeping enough fat in the hopper to seal the opening during the charging operation. This is just a small detail which helps in cutting down the escape of bad odors in the plant.

Another point is the size of the tank for the deodorizer and its location. The size used by us was six feet long and six feet high by two feet wide. This was sufficiently small so that it could be placed in some out of the way corner of the plant and at the same time was large enough to do the deodorizing effectively.

This equipment although it has been a private development worked out in the plant of the company now using it by the writer, might be made available for the use of other renderers although patent application has been arranged for. Further details may be secured by communicating with *Oil & Fat Industries.*

Trade Mark Disputed

(*From Page* 28)

later comer. And, in this "Purola" controversy, the Vegetable Oil Products Company was the junior party. But, applying the test of "confusion in trade" there could be found no justification for denying the use of a trade-mark double to a product so far removed from lubricants as is a lard substitute. It was not merely that the maker of inedible products failed to cite any actual instances of mix-ups between his wares and the hard fat shortening. Federal referees entered into a far-reaching analysis of possibilities of "trade confusion," as, indeed, they always do in close cases.

Not only was there taken into account the dissimilarities of the products themselves and their contrasting uses but it weighed that hard fat shortening and automobile lubricants are seldom if ever sold in the same stores. Nor could the excuse be made that these are goods which are sold at low prices and are purchased hurriedly and heedlessly by casual classes of customers. Both the U. S. Examiner of Interferences and the power higher up, the U. S. Commissioner Patents, declared that there was no chance that a lard name or a lard substitute name would be taken for the nickname of a lubricant. This decision does not mean that the Patent Office will countenance any split-up of what is clearly defined as a food field. It still sticks to the principle laid down when it was ruled that butter and condensed milk have the same descriptive properties. But distant neighbors are not to be allowed to interfere with one another. Oil and fat producers have a perfect right to borrow the popular brand names originated in other branches of trade if the joint usage does not produce confusion or mistake in the mind of the public.

W. A. Mott, oil mill and refinery engineer, who has been in this country for the past year, after several years of service with the Soviet owned oil mills in Russia, has gone to Merida, Yucatan, Mexico, to manage the lard compound factory of Montes Lejeune & Cia., cottonseed crushers, in that city.

OIL & FAT INDUSTRIES

The Editor's Page

A Progressive Trade Association

ELSEWHERE in this issue we publish a report of the Fourth Annual Convention of the Mayonnaise Products Manufacturers Association of America, Inc., and of President C. P. McCormick's address to that body. We cannot refrain from calling to the attention of our readers the splendid spirit of co-operation and progress which permeates this association, and the definite services which the association has rendered its members and its industry as a whole.

Founded only four short years ago, this trade group has already succeeded in obtaining the establishment by the United States Government of definite standards for their products, and particularly through their research committee, have contributed splendidly to the fund of general knowledge covering the manufacture and marketing of mayonnaise. They have improved the quality of the raw materials used, as well as of methods of preparation and packaging.

The members of this association approach their meetings with a spirit of willingness to engage in frank discussion of their problems with their rival manufacturers, convinced that the industry as a whole will be benefited by the widest possible dissemination of knowledge of new discoveries and improved methods. The question of business ethics comes in for its share of attention in the deliberations, and there is no hesitation on the part of any member in condemning competitors' practices which may have the appearance of unfairness. Those criticised, in turn, accept the suggestions in good part, and appear eager to conform to the Code of Practice, which, after all is only adherence to the Golden Rule.

Such methods of trade association conduct are sure to guarantee success for the industry and for every producing unit therein.

Credit Restrictions

TIGHTENING of credit requirements on one trade group will frequently bring an automatic extension of the same policy in other directions. In Cincinnati, the paper trade adopted a more stringent credit policy recently. As reported in the last issue of *Oil & Fat Industries*, a set of definite credit regulations were drawn up and adopted by the local paper merchants as a group. Notice was served on their customers of the new rules. It so happens that most of their customers are printing organizations. The reaction of the printers to more stringent credit regulations on the purchase of paper, was to notify their own customers, that is, the buyers of printing and printed matter, that in view of the manner in which they would now be compelled to meet their obligations they should expect these buyers to adhere to the same general rules. In short, in order to pay their bills promptly, their customers must in turn pay them in the same manner. This enforced spreading of the doctrine of prompt payment and the elimination of long term credits cannot but be a help to business generally. It illustrates aptly the strength behind sincere group action.

The Great Discovery

THE United States Senate has just discovered that there are lobbyists in Washington who have upon occasion attempted to influence the course of legislation. This momentous "discovery" should earn places in the Hall of Fame for the present members of this august body, along with Columbus, the discoverer of America, and Will Rogers, who discovered how funny Congress really can be at times.

The apparent horror with which the Senate has reacted to its "discovery" leads us to believe that the American stage has been robbed of many a great actor. Paid lobbyists in Washington? The indignant surprise of the "discovery" is worthy of a broad grin. We wonder who Congress thought these gentlemen were.

It is about time that the pose of holy innocence on the part of some members of Congress was discarded. To register great surprise when it is "discovered" that Washington is literally alive with lobbyists, is pure unadulterated fakery, and the member of Congress who does it is acting a lie. Any member of Congress who does not know and has not

known for years that every conceivable type of lobby exists in Washington, just as in every state capital and every other seat of government, should be a candidate for a home for the feeble minded, rather than for re-election.

As for the lobbyists, we cannot arouse ourself to any great indignation against them or against the manufacturers who support them. We cannot see what is wrong in payment by a group of manufacturers, for the services of an expert who knows legislation, legislative methods, and practical politics, one who can direct and coordinate the efforts of manufacturers for or against legislation which directly affects their businesses. Lobbyists have been active in Washington for years and years, and we cannot see that the country has suffered a great deal as a result of their activities. Why the Senate should select the present time to become excited over them is not immediately apparent to the unprejudiced observer.

The Shortening and Oil Division of the National Cottonseed Products Association held its October meeting on the 22nd at the Palmer House, Chicago. The next meeting of the Division will be held in Memphis, Tennessee the latter part of November.

The Tucson Cotton Oil Company, Tucson, Ariz., and the Western Cotton Oil Company, Phoenix, have filed a complaint with the Interstate Commerce Commission seeking a lower carload freight rate on cottonseed oil from Tucson to Los Angeles, San Francisco, and other points in California, and the establishment of a refining-in-transit privilege at Phoenix under the through rate from Tucson.

Satisfactory results in the cultivation of tung oil trees in New South Wales have been reported by the Australian Commonwealth Development and Migration Commission. Experiments have been in progress since 1919, and a yield of high grade oil is reported.

The Federal Trade Commission has issued complaints against two olive oil distributing firms of New York City, for collaborating in the sale of allegedly misleading tin can containers in the distribution of olive oil.

Proposed Tung Oil Orchard

A syndicate is being organized in New Orleans to purchase 20,000 acres of land in southern Mississippi and carry on the growth of tung oil trees, as well as other extensive agricultural and horticultural development. The promoters are encouraged by the success of the tung oil orchard enterprise in Florida, which, in its third year of operation, is commencing to produce a very superior quality of tung oil from the crushing mills on its plantation at Gainesville, Florida. The Mississippi project contemplates the planting of many kinds of fruit trees, as well as the production of berries and garden truck and the maintenance of poultry, dairy and beef cattle and other meat animals, with the idea of supplying the New Orleans market by means of daily motor truck delivery.

The Colgate-Palmolive-Peet Co., the Kraft-Phenix Cheese Corporation and the Hershey Chocolate Company are to be merged through the medium of a gigantic holding corporation, to be known as International Quality Products, Inc. In line with other recent mergers, the benefits expected from the new combination are chiefly those of more economical distribution. Charles S. Pearce, President of Colgate-Palmolive-Peet, is to be President of the new corporation.

Foreign Trade Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces that its representatives in all parts of the world have forwarded the following trade inquiries of interest to our readers. In writing the Bureau in reference to any of these inquiries please mention that you saw it in *Oil & Fat Industries.*

No.	Location	Material	Purchase or Agency
41393	Colombia	Lard	Agency
41515	England	Linseed Oil	Purchase
41532	Italy	Lard	Agency
41525	Scotland	Vegetable oils	Agency
41558	Germany	Cottonseed oil and shortening	Both
41629	Germany	Fatty oils and tallow	Both
41623	Colombia	Olive and coconut oils	Agency

Oil Chemists' Fall Meeting

Third Mid-Year Gathering at New York Brings Out Enthusiastic Attendance of Oil and Soap Technologists

By W. A. PETERSON

THE THIRD Fall Meeting of the American Oil Chemists' Society was held at the Hotel McAlpin, New York City, on November 14th and 15th. Many of the members of the Society, from all parts of the country, were in attendance, and the papers presented contained several valuable contributions to the chemistry and technology of oils and soaps. The complete minutes of the meeting follow:

Thursday, Nov. 14th: Meeting called to order at 10 A. M. by H. P. Trevithick, Chairman of the Local Committee. After his introductory remarks, Mr. Trevithick turned the meeting over to A. K. Church, 4th Vice-President and Chairman of the Soap Section, who thereafter presided. The following committee reports were read and accepted:

Fat Analysis Committee	W. H. Irwin
Olive Oil Committee	L. M. Roeg
Referee Board	W. H. Irwin
Moisture Committee	W. H. Irwin
Planning and Uniform Methods Committee	J. J. Vollertsen

A report of the work of the Soap Section was read by the secretary, W. A. Peterson. Dr. David Wesson addressed the meeting on "The Historical Aspects of Vegetable Oil Refining", citing some very interesting and amusing incidents in the early days of the art. A paper on "The Composition of Porpoise Jaw Oil" was presented by Dr. A. H. Gill. A paper on "The Use of the Bomer Test in Differentiating Lard and Lard Compounds" by H. P. Trevithick and M. F. Lauro was turned over to the society for publication and its reading omitted on account of a very full program. E. V. Romaine presented a paper on "The Development of the Wood Rosin Industry". A paper on "Precision Color Measurements with a New Photoelectric Instrument" was presented by H. A. Ellsworth. The use of this instrument was illustrated by lantern slides showing characteristic color curves for various oils.

Mr. Church announced a meeting of the Detergents Committee for 3 P. M. after which the meeting adjourned. A luncheon followed at which Dr. Wesson presided as toastmaster. A telegram from President Stryker expressing regret at his inability to attend was received and read at this time.

Friday, Nov. 15th: Meeting called to order at 10 A. M., Mr. Church presiding. A paper on "Surface Films of Fats and Fatty Acids" was presented by Dr. A. W. Thomas. Dr. A. H. Holmes read the next paper on "Cod Liver Oil and the Vitamin Theory". "Expanding the Market for Soap and Glycerine" was the title of an address by R. C. Edlund, describing the educational work being carried on by the Association of American Soap and Glycerine Producers. A program of research to discover new commercial uses for glycerine was described.

A pleasant surprise was injected into the meeting when someone discovered the presence of Billy B. Van, of stage fame, and the maker of Pine Tree Soap. Billy was prevailed upon to address the meeting and did so to the evident delight of all present, judging by the uproarious merriment which he induced. The humorous incidents called to mind connected with Billy's entrance into the soap business constituted a high spot in the day's program.

A paper on "Systematic Organic Analysis" was presented by W. F. Whitmore. M. F. Lauro read a paper on "Presentation of Evidence in Oil Litigation."

"The Use of the Ultra-violet Ray in Detecting the Presence of Refined Oil in Virgin Olive Oils" was explained in a paper by Sidney Musher, with a demonstration on actual samples under the ultra-violet light. It was suggested that the society recognize this test by incorporation into its methods.

Mr. Trevithick announced a visit to the laboratories of the Appraisers' Stores for 2 P. M. Mr. Church called for a meeting of the Soap Section Committee immediately following the morning session.

Prior to adjournment the following resolution was unanimously adopted: "Whereas, the Hotel McAlpin has very generously provided the Colonial Room for our use as a meeting place and whereas, the hotel's management,

particularly Mr. J. P. Hoenig, business promotion manager, has been most courteous and helpful in furthering the success of our 3rd Annual Fall Meeting, now, therefore, it is unanimously resolved by The American Oil Chemists' Society that a vote of thanks be extended to the Management of the Hotel McAlpin, and that copies of this resolution be forwarded to the Management and to Mr. Hoenig". The meeting was then adjourned.

Apparatus and Chemical Exhibits

IN CONNECTION with the meeting there was a most interesting display of apparatus and bleaching materials by the following firms:

Fred S. Carver Co.—Showed the Carver hydraulic laboratory press, together with equipment for pressing of oils and liquids. Exhibit in charge of Fred S. Carver and H. H. Fronn.

Industrial Chemical Sales Co.—Showed Nuchar W, Nuchar 2, Nuchar 00, I. C. Bleach, M. G. Bleach and Diafilt. Samples of oils and glycerin were exhibited before and after treatment with these products. Exhibit in charge of E. L. Luaces, D. A. Kemper and John P. Harris.

Darco Sales Corp.—Showed Darco decollorizing carbon. Exhibit in charge of L. M. Gill.

Turbo-Mixer Corp.—Showed a model of their mixer which may be had in sizes from 2 to 100,000 gals. capacity. Exhibit in charge of W. C. Pinkerton.

L. A. Salomon & Bro.—Showed their Norit decolorizing carbon, English fullers earth, German bleaching clays and infusorial earth. Exhibit in charge of A. A. Kramer.

Laboratory Construction Co.—Advertised their Kjeldahl nitrogen apparatus, electric heaters and laboratory equipment tables.

Eimer & Amend—Showed samples of vegetable oils and the corresponding color charts as obtained by their new spectrophotometer. Photos of the machine were also on view. The machine is sold by Eimer & Amend under license from American Photoelectric Corp. Exhibit in charge of John C. Vosoff.

Christian Becker, Inc.—Showed their analytical and laboratory balances, including the Chainomatics, for surface tension and specific gravity determination, as well as a notch beam balance for analytical work. Also showed a balance with dash-pot to reduce oscillations. Exhibit in charge of J. W. Wetz.

Bausch & Lamb Optical Co. — Showed their new spectrophotometer as used for oils, also their Duboscq colorimeter, microscopes and a photomicrographic camera. Exhibit in charge of J. A. Scheick and F. J. Lanz.

Emil Greiner Co.—Showed their official vegetable oil colorimeter, a constant temperature bath for determining viscosities, stop watch supports, a special Lovibond colorimeter, electric relays and motor stirrers. Exhibit in charge of J. P. Bader.

Olive Oil Committee Report

DURING the last two years we have had before us the problem of differentiating between virgin olive oil, refined olive oil, and mixtures thereof. This report is more a program for the next six months than a report of the work by the Committee during the last five months. Three members of the Committe have recently worked on this problem. Sidney Musher has been using ultra violet light for distinguishing virgin olive oil from refined olive oil. He will give a demonstration before the Society showing the value of this method. For quick dependable routine work this method seems to be the best.

In last May's report we mentioned that W. H. Dickhart developed a method for virgin and refined olive oil, using an alcoholic solution of sulfuric acid and alcoholic solution of furfural. The red color produced is removed by treating with N/10 sodium thiosulfate. The complete method for obtaining this proposed Dickhart thiosulfate number for olive oils is now given in the *Oil & Fat Industries* for November. It is planned by our Committee to repeat this recently published method, and a report will be given at our next meeting.

M. F. Lauro identified sodium in the minute quantity of soap dissolved in refined olive oil by means of microscopic examination of the double salt of uranyl acetate, and sodium-bismuth, the double sulfate of sodium and bismuth. Although this method is too tedious for routine analysis, it will be useful for our Committee as a corroborating test for the thiosulfate number and the quick routine ultra violet light method.

LOUIS M. ROEG, *Chairman*
Olive Oil Committee
American Oil Chemists' Society

Fourth Annual Mayonnaise Convention

Enthusiastic Meeting at Atlantic City Devoted to Study of the Industry's Commercial Problems

AT THE Fourth Annual Convention of the Mayonnaise Products Manufacturers' Association of America, Inc., held at the Hotel Traymore, Atlantic City, New Jersey, on October 28, 29, 30, the keynote of the members' discussions was "What Price—Volume." Practically all the members present decried various unfortunate practices which have been characteristic in the past of merchandising methods in the sale of mayonnaise and mayonnaise products, such as the giving of free goods, overstocking of retailers and similar artificial means for the stimulation of distribution.

A large and enthusiastic gathering of the industry's leaders were in attendance at the convention, and all present were agreed that, under the able guidance of President McCormick, the meetings achieved real progress toward the Association's goal of mutual progress and co-operation among the members for the general advancement of the industry as a whole. The complete program follows:

Monday Morning, October 28th

8:30-10:00 Registration.

10:00 Call to order by President C. P. McCormick (Vice-President, McCormick & Co.).

Invocation: Dr. H. E. A. Durell, Pastor of the Church of the Ascension.

Welcoming Address: Hon. A. M. Ruffu, Jr., Mayor of Atlantic City.

Response: W. D. Kennedy (El-Food Corporation).

President's Annual Message: C. P. McCormick.

Report of Secretary and Treasurer: Anna Schlorer Smith (Mrs. Schlorer's, Incorporated).

11:15 Appointment of Nominating Committee, and announcement of time and place of the election.

Committee Reports: Publicity, W. R. Collins, Chairman; Advertising, E. J. Bannvart, Chairman; Membership, Frank Honicker, Chairman.

Address: *"The Future of the Mayonnaise Industry,"* by Richard Hellmann.

Monday Afternoon, October 28th

2:00 Address, *"Distribution Problems — Present and Future,"* by Gorton James, the "The Business Week," a McGraw-Hill publication.

Address, *"New Selling Ideas Are Changing Products, Companies and Industries,"* by Raymond Bill, Editor of "Sales Management."

F. A. HONICKER
Exec. Sec., M. P. M. A.

Address, by D. M. Gray, Chairman of our Research and Standards Committee, covering important phases of this Committee's work for the year.

3:30 Ten-minute addresses, with discussion, on market conditions of:

Eggs, M. C. Reynolds (Epstein, Reynolds & Harris).

Vinegar, Wm. B. Klein (Standard Brands, Inc.).

Malt Products, W. M. Brownell (Schreiber Products Corp.).

Pickles, H. A. McGinnis (H. A. McGinnis Company.

4:45 Report of Nominating Committee.

Monday Evening, October 28th

7:15 "Philadelphia Night." Sea food dinner in Submarine Grill, Hotel Traymore, followed by surprise entertainment.

Tuesday Morning, October 29th

9:30 Address, *"How Much has the Consumption of Mayonnaise Increased in the Last Ten Years,"* by R. S. Hollingshead, Asst. Chief, Foodstuffs Division, Dept. of Commerce.

Address, *"Selling the Chain Store,"* by

(*Turn to page* 19)

The Mayonnaise Industry of the United States

Address Before Fourth Annual Convention of The Mayonnaise Products Manufacturers Association of America

By R. S. HOLLINGSHEAD, *Assistant Chief,*
Foodstuffs Division, Bureau of Foreign and Domestic Commerce

THE production of mayonnaise and related products is such a new development as a commercial enterprise in this country that the Bureau of the Census in taking the Census of Manufactures previous to 1927, never separated these products from "Sauces, salad dressings, etc." Those directly interested in the industry, and those which supplied the manufacturers with the necessary raw ingredients and containers were aware of the fact that the industry was growing, but none of these interests had any definite idea of the size of the business or the rate at which it was developing. The Census figures for 1927 show a production of mayonnaise of a value of slightly over 27 million dollars, cooked dressings just under $700,000, and "other raw dressings" of about six and a half million dollars. Those figures are more inclusive than the ones presented here, as replies from all but the small producers are compulsory. In the absence of previous figures, nothing can be deduced from them as to the growth of the industry. With the desire to obtain some definite facts in this connection, the Mayonnaise Products Manufacturers Association of America called on the Bureau of Foreign and Domestic Commerce to assist them in the collection of such data as would tell something of the story of the development.

After a number of conferences with officials of the Association, a form of questionnaire was drawn up and submitted to a list of about 725 firms and individuals whose names were obtained from the Association and from other sources. The business mortality among the smaller organizations is apparently great, for of the questionnaires sent out, 167 were returned with the notation that the addressees were out of business, had moved, or could not be located for other reasons. Some 200 replies were received and of these, 148 contained more or less information that could be used in making the final tabulations. It will be noted that there still remains quite a large number of questionnaires which are unaccounted for. These are attributed to those who were too small to think it made any difference whether they reported or not, and those who for various and sundry reasons did not care to reply. This latter class is undoubtedly large, but in view of the fact that such a survey had never been attempted before, and many of the men in the industry had not had a chance to learn what might be gained from a knowledge of the true facts regarding their own business, the failure to obtain more replies was not astonishing nor discouraging. It might be mentioned at this time that the Department of Commerce appreciates greatly the assistance rendered by the various trade papers which gave so much valuable publicity to the proposed collection of information from the producers.

For those who may be interested, there is included a copy of the questionnaire used. Compilations were made at the date submitted without any attempt to distinguish between the various types of mayonnaise referred to. In order to use many of the replies it was necessary to make a number of assumptions. These were based either on averages taken from completed replies, or from statements obtained from trade and other sources. The conversion factors referred to are: a weight of 7.4 pounds per gallon for both mayonnaise and salad dressing; a value of $2.26 per gallon of mayonnaise, light or heavy; and $2.66 per gallon of salad dressing and sandwich spread. Some questions may be raised over these figures, but it is not believed that their use has resulted in any considerable inaccuracies, partially as they must be reasonably correct, and partially because they were used rather infrequently.

The mayonnaise industry has been one of recent and rapid growth. Many of the larger operators were, only a few years ago, very small, and small manufacturers have been continuously growing larger. These rapid changes have made it impossible to obtain records of many firms over a period of years. As will be seen from the following table, only five operators gave figures for nine years, although twenty-three were able to furnish such information for five years. The growth of the

CONFIDENTIAL

Mayonnaise and Salad Dressing Production Census

1. Do you manufacture a heavy or a free flowing type of mayonnaise?
   Heavy..... Free Flowing.....
2. Please give production figures on mayonnaise and kindred products, such as salad dressings for as many years as possible.

IF YOU CANNOT GIVE ALL THE FOLLOWING—GIVE WHAT YOU CAN

MAYONNAISE

	Invoice Value	Volume Pounds or gallons
1920		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		

SALAD DRESSING, ETC.

	Invoice Value	Volume Pounds or gallons
1920		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		

3. What proportion of your output is packed in the following size containers? Please estimate if exact figures are not available.

3	oz.....%	Pint	
3½	" .....%	Quart	
9	" .....%	Gallon	
11	" .....%		

Other sizes, giving volume:

..... oz. .....%
..... " .....%
..... " .....%

4. What proportion of your output is mayonnaise? .....%
   Sandwich spread or relish .....%
   Thousand Island or other dressing .....%

(Estimate, if exact figures are not available.)

5. What proportion of your output is sold under:
   Your own brand .....%
   Buyer's labels .....%
   Unlabelled .....%
6. What proportion of your output is sold:
   a. Direct to consumer .....%
   b. Direct to retailer .....%
   c. Through wholesale grocers .....%
   d. Through chain stores .....%
   e. In other ways (name) .....%
7. When is your peak season or which months do you consider the best?

Company .....
Address .....

TABLE I.

Mayonnaise Production Trends (Dollars)

Number of concerns	1920	1921	1922	1923	1924	1925	1926	1927	1927
5	90,995	146,930	286,152	381,025	401,565	496,905	368,957	436,320	469,642
23	—	—	—	—	4,663,818	6,382,383	6,876,128	8,221,588	9,933,016
57	—	—	—	—	—	—	8,549,587	10,833,753	13,816,209
70	—	—	—	—	—	—	—	11,028,841	14,140,558

Salad Dressing Production Trends (Dollars)

Number of concerns	1920	1921	1922	1923	1924	1925	1926	1927	1927
17	—	—	—	—	1,572,160	1,762,163	1,952,868	1,950,529	2,193,573
43	—	—	—	—	—	—	2,802,428	2,879,282	3,275,094
54	—	—	—	—	—	—	—	3,046,338	3,530,239

industry is very well shown by this tabulation. The rate of growth for the five long time operations is almost the same as for the larger number of firms, manufacturing on a bigger scale for five years.

The same facts are shown in a different way in the next chart. The narrow line shows the changes which took place from year to year, and the broad line shows the average rate of growth for both mayonnaise and salad dressings. The trend line is designed to eliminate the effect of variations in the output which take place from year to year, and to picture what is to be expected in the future if no unusual conditions arise. Attention is called to the fact that the growth of the industry is coincident with the increased use of fresh vegetables in the general dietary of the people

of this country and the tendency to turn over to the factory many of the operations which were previously part of the usual kitchen practices.

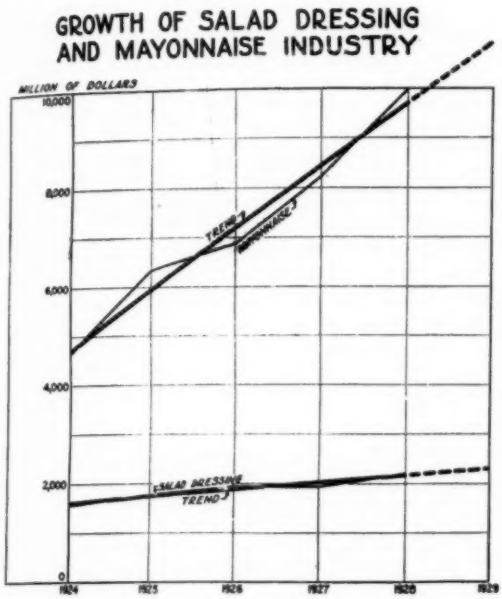


Fig. I. Growth Chart

One of the questions in the questionnaire asked for the naming of the months which were most active. Replies indicated that the summer months were generally regarded as the most important in all parts of the country, but when considered geographically, there was noted a trend for the busy months to occur earlier in the season in the south and far west than in the northern and central parts of the country. The relative importance of the months appears in the next table. A total of 103 replies to this question were received. June and July each received 70 votes, the highest, and November was lowest with only 5. The distinctively poorer showing of the fall and winter months is outstanding. In view of the rapid increase of the consumption of fresh vegetables during this period it would appear that some judicious advertising during this time should be productive of valuable results. This could be done as part of a campaign of institutional advertising or by individuals who are so placed that they can collect the benefits of such a procedure.

TABLE II.

Peak Months in Mayonnaise Industry

June 70	March 22
July 70	October 17
May 66	February 8
August 55	December 7
April 42	January 6
September 40	November 5

Container Sizes

LIKE many other industries which use small containers, during the course of the year, a considerable number of sizes have come into use. Every investigation into this question has shown the same facts, and the absence of any very good reasons for the practices. Excluding the five gallon size, reports indicate that 21 different sizes of containers are used for mayonnaise, salad dressing and sandwich spreads. Of these, six, namely, the gallon, quart, pint, half pint, three and one half ounce and the three ounce sizes are used for over 85 per cent of the total amount reported sold by the 113 organizations which answered this question. The need for standardization and simplification of sizes is self evident.

TABLE III.

Distribution of Mayonnaise by Sizes of Containers

Size of Container	Number of Concerns Using this size	Percent of total in each size
1½ oz.	1	0.173
3 "	25	3.950
3¼ "	4	0.600
3½ "	51	13.275
4 "	3	0.044
5 "	1	0.001
6 "	4	0.344
6½ "	1	0.401
7 "	1	0.003
7½ "	2	1.560
8 "	80	37.050
8¼ "	1	0.001
8½ "	4	9.520
9 "	17	1.122
11 "	5	0.194
12 "	2	0.160
16 "	91	19.245
32 "	81	5.980
42 "	1	0.010
64 "	3	0.051
128 "	94	6.300
5 gal.	1	0.017

Number of firms showing production by sizes - - 113

The quantity of mayonnaise sold under the labels of the manufacturer appears very large in comparison with the practices of some of the other foodstuff industries where such information is available. The survey showed that 96 per cent is sold in this way, nearly 4 per cent under buyers' labels, and less than 1/20 per cent unlabelled. The necessity of

establishing and maintaining high standards of quality for products so distributed is evidently greater than with products which are sold in such a way that the actual manufacturer is unknown to the buyer, for unsatisfactory quality is immediately credited to the producer.

TABLE IV.

Distribution of Mayonnaise and Salad Dressings

Branding	Value $	Percentage
Own labels	20,294,684	96.00
Buyers' labels	830,248	3.96
No labels	9,900	0.04
	21,134,832	100.00

Based on 123 reports

It is presumed that the foregoing part of this report is of general interest and that the most important section of the report is that which deals with the present conditions in the industry. Attention is called to the fact that in making the following tabulations, there has been no attempt to segregate the different products on any other grounds than the statements made in the questionnaires. There has been, as you all know, considerable difference of opinion as to what constitutes mayonnaise, and certain standards have been set up by the Food, Drug and Insecticide Administration of the Department of Agriculture. Leaving out of consideration entirely these questions, the facts as given in the questionnaires are shown in the next table. The preponderant position held by the heavy type of mayonnaise is most evident. As has been said before, the growth of this branch of the industry is faster than that of salad dressing. No information is available on which to base a similar comparison for the sandwich spread, but it is believed to be one of the rapidly growing items, and now takes second place in value to that of the heavy type mayonnaise. The incompleteness of the returns has already been commented on and attention called to the fact that these figures cannot be taken as a true measure of the size of the mayonnaise industry. There are known to be a very large number of manufacturers which are operating on a kitchen scale. Their individual output is always small, but the total beyond question is considerable. This condition is well known to all who have ever noticed the stocks on shelves of stores in the smaller communities. As a guess, it might be said that the total quantity of the products in which we are interested are made to an extent possibly double that given below.

TABLE V.

Distribution of Mayonnaise and Salad Dressings

Channels		Value $	Percentage
Direct to	consumer	583,147	2.75
" "	retailer	3,367,406	15.93
" "	wholesaler	12,259,618	58.30
" "	chain stores	2,049,799	9.66
By other methods:			
Distributors		1,605,780	
Restaurants		32,033	
Drug stores & Restaurants		7,698	
Hotels and Restaurants		31,306	
Wagons		1,131,955	
Unmentioned		13,656	2,822,428 13.36
Total			21,103,398 100.00

Based on 122 reports

How the Consumer is Reached.

THE replies to this part of the questionnaire were on the whole quite satisfactory, although there is some doubt as to the exact meaning of the statements made in a few cases. The doubtful replies are concerned with only about 10 per cent of the total amount, so that they do not greatly affect the final results.

The next table shows the different methods of distribution as reported to us. It appears that a rather small proportion of the total is sold through chain stores compared with the usual grocery lines. More than half of the products are handled by wholesale grocers. Under the heading of "By other methods" several statements were found which are of questionable interpretation. It would seem very possible that the goods shown under the headings of 'Distributors' and 'Wagons' may be sold, at least in part, directly to the consumer, or to the retail grocer. No means are at the disposal of the Department to decide on this point, but those who are more familiar with the trade can probably do so without difficulty.

TABLE No. VI

Production by Products in 1928

	Dollars	Gallons	Percentage by volume
Mayonnaise, Heavy	15,612,672	6,789,727	75.80
Mayonnaise, free flowing	303,062	159,580	1.79
Mayonnaise, semi flowing	643,285	75,575	0.84
Salad dressing	2,173,531	820,384	9.17
Sandwich spread	3,108,764	1,111,271	12.40
	$21,841,314	8,956,537	100.00

Based on 126 Reports

Summary

THERE is every reason to believe that the growth of the industry will continue in the future as it has done in the past, assuming that the quality of the products is as well maintained as it has been. In general, the confidence of the buyer has been gained, and there is less and less tendency to go to the trouble to make the products which can be

(*Turn to Page* 33)

Mayonnaise Convention

(*From page* 13)

H. H. Lestico, Publisher of "Chain Store Manager," and nationally recognized authority on chain store operation.

Address, *"Nutritive Value of Mayonnaise,"* by Dr. E. M. Nelson, Protein and Nutrition Division, Bureau of Chemistry and Soils, Washington, D. C.

Address, *"Better Business Through Better Trade Relations,"* by Dr. Hugh P. Baker, Trade Assn. Dept., Chamber of Commerce of U. S.

11:00 Committee Reports: Legislative, B. S. Pearsall; Glass Container, E. H. Farmer; Finance.

Ten-minute addresses, with discussion, on market conditions of: Cottonseed Oil, Dr. David Wesson. Spices and Mustard, C. P. McCormick. Caps, Jules Dommergue. Salt, J. J. LeClare.

12:00 Annual Election of Directors.

Tuesday Afternoon, October 29th

2:15 Executive Session for active members only.

"Get It Off Your Chest!" An informal frank open discussion on problems of the industry, trade practices, and a free interchange of thought on policies.

Report of Trade Practice Committee, by Wm. R. McKeldin, Chairman.

Report and recommendations by Research and Standards Committee, D. M. Gray, Chairman.

Tuesday Evening, October 29th

6:45 Annual Banquet, Hotel Traymore. Ernie Finch, Toastmaster. Thurman Miller, of Wilmington, Ohio, newspaper editor, spoke on the subject, *"Sportsmanship."*

Entertainment.

Wednesday Morning, October 30th

9:30 Address, *"Foreign Trade Prospects for* 1930," by Franklin Johnston, of the "American Exporter."

Address, *"The Behavior of Mayonnaise at Low Temperature,"* by Benjamin Harris, of Epstein, Reynolds & Harris.

Address, *"The Future of Retail Distribution,"* by Ransom R. Gilbert, Grocery Specialist, Department of Commerce. Mr. Gilbert is thoroughly familiar with the Louisville Survey.

Report of Resolutions Committee: Mrs. Anna Schlorer Smith, Chairman, Wm. R. McKeldin, L. R. Bradford, J. Kurnik, Marion C. Harper, M. R. Van Benschoten.

Report of Transportation Counsel, Joseph C. Colquitt, Esq.

12:00 Adjournment.

The officers elected for the coming year are: President, C. P. McCormick, of McCormick and Company, Baltimore, Md., Vice-President, Wade E. Utley, of Capital City Products Company, Columbus, Ohio, Secretary, Mrs. Anna Schlorer Smith, of Mrs. Schlorer's, Inc., Philadelphia, Pa., Treasurer, W. R. McKeldin, of Atmore and Son, Inc., Philadelphia. Franklin A. Honicker, of Philadelphia, continues as Executive Secretary.

Oleomargarine Legislation

FORTY-TWO bills imposing restrictions or levying taxes on dealers in oleomargarine were introduced in state legislatures during the past year. Of these only ten became laws. Five of the bills passed were similar to the so-called "Haugen Bill" before the National Congress, which provides that all compounds offered for sale which simulate butter in appearance shall be designated "oleomargarine." These bills were enacted into laws in the states of Colorado, Kansas, Missouri, Nebraska and Vermont.

The Connecticut law provides for the repeal of that portion of the Public Acts which allowed credit on license fees of manufacturers or dealers in oleomargarine who discontinued such operations before the expiration of a year for which they had paid the license tax, and the Montana measure re-enacted the oleomargarine law and repealed certain other laws. Taxes were levied by the Idaho and Utah laws, in the former a tax of $200.00 per year on wholesale dealers, $50.00 per year and $27.50 per half-year on retail dealers.

In Utah a tax of 5c per pound on uncolored margarine and of 10c per pound on colored margarine, also a license fee of $5.00 per year, were imposed upon those selling consumers. This measure also provided that all products made in semblance of butter must be labeled "oleomargarine." The Wyoming law prohibits the use of dairy terms in connection with the sale or advertisement of oleomargarine.

A new whaling company has been organized in Sydney, N. S. W., Australia, with an authorized capital of £750,000, of which £415,000 will be offered for subscription, for the purpose of exploiting the whaling resources of the Antarctic and Southern Seas, for the acquisition of a whaling station at Norwegian Bay, Point Cloates, in the northwest of Western Australia, already in operation, and the construction of a shore station on the south coast of New South Wales.

McCormick Addresses Mayonnaise Producers

President of Manufacturers' Association Reviews Industry's Rapid Rise and Sounds Keynote of Future Policy

In addressing the Fourth Annual Convention of the Mayonnaise Products Manufacturers' Association of America, Inc., at Atlantic City, on Monday, October 28, President C. P. McCormick described the rapid growth of the mayonnaise industry and of the Association, and stressed the importance of co-operation between the members for the elimination of destructive practices such as unfair price-cutting, free goods, introductory discounts and the like. President McCormick's address follows:

Charles P. McCormick

OUR ASSOCIATION — the MAYONNAISE PRODUCTS MANUFACTURERS ASSOCIATION OF AMERICA, has grown in a short four years, because of service, from a small, struggling trade association to one of prominence among the food industry. It has been a pleasure for me to participate slightly in this advancement and in giving praise where it is due, may I say that I have no desire to take your time for effect or for reasons other than that you should know the causes of its growth. There are always a few faithful disciples in every multitude who are willing to give of their time, energies and efforts to elevate, promote and inspire their industry to greater heights. I want to thank our first President, Mr. Simon Gelfand, and Mr. Richard Hellmann, Chairman of our Board for their pioneer spirit in organizing this Association. Mrs. Anna Schlorer Smith, your Secretary and Treasurer, has been a leading light in showing the way to others in cooperation, and she has been most helpful in every way. Mr. E. P. Kelly, the Vice-President, while an unsually busy man, has always been ready for any call, and Mr. Franklin A. Honicker, the Executive Manager of the Association, has performed excellent work in Philadelphia. From all sides I hear praise of his diplomatic, yet businesslike dealings with each problem, and certainly his continuance as Executive Secretary should insure your association of future progressive guidance. His willingness, accuracy and dispatch of work have made your President's work easy and pleasant, quite different from the year when his services were not available. Mr. W. R. McKeldin, Chairman of the Trade Practice Committee, has helped in building up the foundation for future work on practices. His experiments in Baltimore, Philadelphia and elsewhere have proven that well known theory that "hated competitors" ruin good business, while "friendly rivals" make better business and better profits. We owe a debt of appreciation to Mr. Dan Gray, to the Board of Directors, to the Press, to Trade Publications and particularly to each and every Chairman, for they have all helped to increase the Association's standing.

Your Chairman desires to express personally, in behalf of the Association, our appreciation to the speakers to follow for their willingness to assist in making our program a success and also to publicly state that we miss the counsel of our friend Mr. B. S. Pearsall—now in Europe, our loyal supporter, Mr. Simon Gelfand—in California, and the genial Mrs. Eugenia Duke also in California. They can all be assured of the cer-

tainty that we miss them and wish them not only the best of luck but happiness and health. There are a few other familiar faces missing that are just as much missed. In closing my informal remarks to our membership, may I again thank you individually for the kindness shown your President during his two terms of office. Most of you have been charitable and faithful towards building up an association that should stand the test of changing conditions, disputes, mergers and any "shake up" in the future. I have been repaid manyfold for the meagre part that I may have played in its development by the friendships that have been made through my contact with each one of you, and may I be fortunate enough to retain that friendship in the future.

Value of Trade Association

WERE you ever asked what you had received through your contact with your Trade Association meetings? Could you honestly answer? Were you perchance in the class of a member who said it was a pure waste of time and only a good frolic to be had? If you honestly believe that Associations are useless, then I am willing to wager that you have buried your talents and will keep them buried. In traveling over this country I am greatly amused by the Pullman type of spokesman who declares to the whole train that "America has gone Convention mad" and that they are only drinking bouts at night, days of recuperation, and entertaining in between. May I say that this type of individual rightly belongs at home with his "little hammer" for he cannot help a Trade Association nor can he secure anything from it in return.

There are other types of men, however, filled with a spirit of advance, ready to meet their competitors, exchange their views and ideas, and also other men that have a vision of the future and are willing to cooperate in developing the future of their industry to the best of their belief. This latter type of man will give and receive benefits from Trade Associates. One always receives in the proportion that he gives to a proposition. A man generally thinks in terms of his own actions, therefore if in the future, you are asked the question again—think it over carefully before answering. An Association to thinking people is not only a source of information but a benefit, and a place to find the flaws in their business when rubbing shoulders with other successful business men. You are all striving to be successful men, I believe, for otherwise you would not be here. To the skeptics may I throw out these questions with the hope that they may inspire them to study national American Life closer. Why does America spend $20,000,000 annually through cooperative association advertising or promotion work? Incidentally this appropriation is for only one hundred associations and there are hundreds more that spend money cooperatively as well. Why was a Standard passed to protect the Mayonnaise Industry? Did an individual do this and why is your industry trying to elevate its own standards? . . . . . .

The weakest link is the actual pulling strength of the chain and if we have some disgruntled selfish members that will not cooperate then the entire chain will suffer—but—there is no use throwing the chain away as it has its uses in proportion to its cooperative strength. New links will supplant the weak links eventually, for only the "above-board" progressive type can endure the struggle. Then our association chain will be strengthened as the "weak policied sisters" are eliminated. Today is a day of playing fair and everything is pointing towards "fair play" even in competitive business, so let us catch the spirit. Many associations have trouble in assembling enough to have a representative showing of the industry but this problem has been solved in the short four years of our activities through hard work and time. Your Association is indeed fortunate in having all the leaders in it and most of them are active too. It also has most of the middle sized concerns functioning cooperatively, as well as a great host of the smaller localized groups whose views are essential to the development of a worthwhile association. . . . . .

I confess that I feel we have progressed in the last year for the larger and stronger manufacturers are willing to eliminate such things as free goods, selling at or below cost, special concessions, inside rebates, etc. if the localized manufacturers will. It seems that the localized man has the advantage but surely failure is facing him if he does not listen to reason and if he tries to build a volume business without profit. The big fellows do not need the little man as much as the little man needs the big fellows' cooperation. The time has come for you to cast away your antiquated views and cease wearing your feelings on your sleeve. A new day is here—that of cooperation and a day when friendly rivals take the place of hated

competitors. In the past we have had many small manufacturers who built marvelous businesses from nothing. The element of price was their secondary consideration. It was striving to maintain high quality at a reasonable price, and quick deliveries. The industry has grown by leaps and bounds and now we are happy to be placed among the leaders in the food line. Your wagon system developed for selling perishables from the manufacturer to the retailer, swept the country, and while not necessarily the originator, you were certainly the leading influence in showing the country a comparatively new method for distributing perishable and non-perishable articles quickly with service. This has grown into other lines and will grow farther than many of us realize at present.

Mergers of small and large companies will continue for it is absolutely the "spirit of the times" and I am confident more are being considered now and will be heard of shortly. Don't let this disturb the independents for an independent that stands the present condition will be much stronger tomorrow. Many mergers today are nothing but promotion schemes carefully planned by financiers with eagerness to enter the food game—a profitable game. A great proportion of the Mayonnaise and Salad Dressing will be handled by a smaller number of manufacturers in the future. However, mayonnaise—a perishable article—has been of a localized nature and it will doubtless continue so—whether made and packed by a local house or a local branch of a national house. The change of things will create new methods of manufacturing, new formulas, etc., but after all the industry must have its local units to properly service the retail outlets. . . . . .

What Price—Volume

"WHAT Price—Volume" is the paramount theme of my paper and address. What price is it costing you to get that volume? Does it cost you your justifiable profit? Then the price is too dear. If on the other hand, increased volume is being brought about by finer and cleverer sales efforts without injury to your profits, then the price is justifiable and economic. I do believe that many are putting on a bold front regarding their profits and volume. Why continue on the superstition that tomorrow will bring about that lost profit of yesterday because your sales are larger. Last year I gave a table showing that:

> A manufacturer with a gross profit of 30% that cuts his discount 20% must sell 200% more merchandise and then only make the same profit and a cut of 25% must sell $6,000,000 to make the same profit as $1,000,000 sales as full gross profit. Price goods encourage poor goods and poor goods curtail an industry's growth.

This schedule shows that many smaller firms can make more profits than larger ones if the larger ones are paying too heavily for their bold front or volume business. Just so long as you smaller manufacturers eye the larger ones with distrust and believe that the towering national giants intend to crush you; and also as long as you leaders look with contempt on the localized man, just so long will your viewpoints not be mutual—neither can your problems be solved amicably. Fair play and a fair deal to all is the spirit of progressive business today. Let us all devote our fighting blood toward better things—bigger distribution and the education of the consumer to a wider use of Mayonnaise—then capture your deserved proportion of the market as it increases in volume. In fighting each other, you may be forgetting the consumer who is your best friend in the long run.

That many in our industry will fail—of course is a fact, but remember that there are more failures in a business like ours because of lack of quality and ignorance of service than anything else. The question of quality should take the place of price for the housewife forgets the price she paid for an article when it is not satisfactory. Let us therefore, as an association strive to educate all our members towards building up a better product at a fair price with a fair profit. Thousands of dollars are now being spent by a few to perfect a "perfect"quality of mayonnaise. This is building an industry while on the other hand underhanded tactics and overloading the trade with material that cannot be used promptly and subject to spoilage is suicidal to the industry as well as to that individual. The industry suffers when an individual goes on a rampage of poor goods and poor practices. . . . . .

WHAT PRICE — VOLUME? Answer that to yourself by looking at your net profits—they tell the story quickly, and remember the Golden Rule was made before mass production, and will remain long after our present methods of service expire.

The European Margarine Industry

Centralized Control Outstanding Feature of Production Which Has Expanded to Great Proportions in Recent Years

By EDWARD G. MONTGOMERY
Chief, Foodstuffs Division,
U. S. Dept. of Commerce.

CONSOLIDATIONS and the passing under unified and centralized control of nearly 90 per cent of the margarine churners of Europe and the United Kingdom have focused more attention on that particular industry in recent months than at any time.

Late in 1927, the two largest margarine manufacturers of continental Europe, Jurgens' and Van Der Bergh, threw their lots together, this fusion of interests being given the name of Margarine Unie. Subsequently the new concern took over by purchase of stock control numerous smaller and hitherto independent companies in various European countries. Van Der Bergh's English subsidiary came into the group and henceforth the new corporation became known in the United Kingdom as the Margarine Union. It was the latter with which it was officially announced in London on September 2 last that Lever Bros. (Ltd.) would ally itself, the actual consolidation to be effected on January 1, 1930.

Margarine Unie, through its affiliated English branch, will thus be welded with the well-known English soap manufacturer who also operates a margarine plant of considerable dimensions. It might be added, too, that Margarine Unie, on the other hand, has acquired a number of soap factories on the Continent, as a result of exercising control over margarine churners who had a physical or financial relationship with the soapers in question.

Because of its ownership of United Africa (Ltd.), formed through the recent consolidation of the Niger Co. and The African and Eastern Trading Co., control of primary sources of palm oil and palm kernel oil is vested in Lever Bros. (Ltd.), and hence Margarine Unie. The latter in turn has increased the scope of its domination of vegetable oils which have such a prominent place in the raw material requirements of margarine churners, through ownership of crushing mills variously located in Europe.

Developments and Expansion of the Industry

SINCE the discovery of margarine as comparatively recent as the early eighteen seventies, the industry has witnessed striking developments and tremendous expansion. This has been true more especially in Europe and the United Kingdom than here at home, because of Europe's earlier and greater dependence on low-priced substitutes for natural animal fats. In the countries where the industry is now largely centered, vegetable fat margarines lead the animal-fat product by a margin that is widening steadily each year. The annual consumption of margarine, based on a compilation of statistics computed in every case within the past two years, records the fact that the grand total of consumption of nine countries was somewhat in excess of two and one-fourth billions of pounds. The countries included in this recapitulation were United Kingdom, Norway, France, Sweden, Denmark, Finland, Germany, Netherlands, and Belgium. In the case of the first three mentioned, actual consumption was not definitely established, but the official estimates furnished are regarded as accurate. No information was available from Spain or Czechoslovakia, but it is known that margarine features to some extent in the daily fat ration of the citizens of the latter country. There is no margarine industry in Italy, Portugal, or Greece, while in Spain it is unimportant and confined solely to the animal-fat article. All four countries just named are producers, and therefore likewise consumers of olive oil, which accounts, no doubt, for the negligible volume of margarine churning in these four countries. Switzerland is mainly an agricultural and dairying country and much the same might be said of Rumania, Yugoslavia, and Hungary, thus explaining the absence of a margarine industry in those countries. Austria has a margarine industry of limited proportions, while Russia is omitted from this review by reason of the lack of authentic data.

The unemployment situation in United Kingdom is credited with increasing per capita con-

sumption in that country from 7.76 pounds in 1913 to 13.28 pounds in 1924, while in Germany consumption after registering a decline from 15.8 pounds in 1922 to 10.3 the following year, largely because of adverse economic conditions prevalent the latter year, was again 15.8 pounds per capita last year. Per capita consumption in the Netherlands rose from 11.9 pounds in 1922 to 17.8 in 1927; in Norway it advanced from 28 pounds in 1920 to 34.3 pounds in 1927. Denmark presents the best example of a rising curve in margarine consumption. In that country the per capita consumption was 34½ pounds in 1922. It was 45.1 pounds last year, and the greatest of all European countries, which is not difficult to understand, as margarine replaces very nearly the entire Danish butter production exported abroad.

Greater Use of Vegetable Oils

ALLUSION has been made already to the fact that the margarine of Spanish production is exclusively of animal fat origin. In no other country may this be said to be true. In the Netherlands and in France animal fats are diminishing yearly in the requirements of the margarine industry and are churned into a mixed product with vegetable oils, but various vegetable oils of an edible nature, i. e., peanut, coconut, sesame, palm and palm kernel, as well as hardened whale and pilchard oils, are finding increasingly common usage. Linseed oil is also employed to a certain extent. In short, the tendency or trend of consumer preference is reflected most emphatically in the broader consumption of vegetable oils and the correspondingly limited demand from European churners for animal fats.

Many of the European countries have no interchange of trade in margarine. A notable exception is the Netherlands, which during last year exported about 33-1/3 per cent more margarine than it retained to meet domestic consumption requirements. Most of these exports went to the United Kingdom, which last year brought in nearly 1,200,000 pounds—the smallest annual importation in a number of years. The Netherlands is credited with supplying all but about 28,000 pounds of this total.

The future would seem to hold the promise of wider markets and increasing consumption as direct results of lower prices for the product effected through economies in manufacture, arising from lessened costs of raw materials, increased efficiency, improvement of the quality of the product, mass production, a more generous advertising policy, and intensive sales efforts on the part of the European industry. The results have already begun to manifest themselves in various ways. In certain sections of Germany lard occupies the principal place as a table fat instead of butter, but its hitherto unassailable position in that country now is being challenged by margarine.

Glidden Foods Changes Name

HAVING recently acquired the E. R. Durkee Company, manufacturers of a nationally famous line of salad dressings, spices and condiments, the Glidden Food Products Co., of Chicago and New York, seeking all advantages possible from the well established reputation of the Durkee products, has changed its name to Durkee Famous Foods, Inc. The Glidden Company has also acquired several other margarine, mayonnaise and salad oil businesses and has purchased the copra crushing plant of the Portland Vegetable Oil Mills at Portland, Oregon. The company plans to expand the Portland plant into a Pacific Coast nucleus for their entire line, according to A. D. Joyce, Vice-President of the Glidden Company.

Diafilt—A New Filter Aid

THE Industrial Chemical Sales Co., Inc. announce that they have concluded an arrangement with the Floatstone Products Company of Los Angeles for the exclusive marketing and distribution of that company's high grade diatomaceous earth for filtration and other purposes. The filtration grade will be offered under the trade name of "DIAFILT" and is claimed to be comparable in clarification efficiency to the best filter-aids now on the market. Regular stocks will be carried at all convenient marketing points.

The Industrial Chemical Sales Co., Inc. are manufacturers of the well-known activated decolorizing and deodorizing carbon "NUCHAR" used extensively as a purifying medium in the treatment of a wide range of products including glycerine, solvents, organic acids, vinegar, sugar and syrups, vegetable and animal oils and fats, etc. "DIAFILT" will be serviced by the experienced engineering staff of the Industrial Chemical Sales Co., Inc.

B. H. Thurman, formerly Vice-President of The Best Foods, Inc., and more recently connected with the National Biscuit Company in an executive capacity, is now associated with Durkee Famous Foods, Inc., with headquarters at Elmhurst, Long Island, New York.

Proposed Thiosulphate Number for Olive Oil

By WALLACE H. DICKHART

THIS article is written for the sole purpose of suggesting the possibility of a new characteristic test for olive oil. It is a modification of a test proposed in 1923. See the detection of olive oil in some refined vegetable oils." (Dickhart*)

Reagents

FROM previous experiments the following method was decided upon: Solution "A." Pour slowly one part of concentrated sulphuric acid into four parts of absolute alcohol, placing the graduate in cold water if necessary to reduce the temperature. Solution "B." A two percent alcoholic solution of furfural. It has been suggested that this solution be made from freshly redistilled furfural. It is advisable to make solutions "A" and "B" as you need them. Solution "C." A tenth normal sodium thiosulphate. The same solution that is normally used to determine the Iodine value. Reagent "D." Carbon tetrachloride.

Proposed Modification

WEIGH into a four ounce oil bottle 7.05 grams of olive oil, add from an accurate pipette 5 cc. of Solution "A," shake, then cork if more than one sample is to be tested. Place the bottle in boiling water (100° C) for three minutes, shaking lightly each minute. When the bottle is placed in the boiling water it will reduce the temperature for a few seconds. Start the time from the point of reboiling. After three minutes remove the bottle, and add 10 cc. of cold water to the mixture, shake and cool the bottle, either under the tap water or in a beaker of cold water. When the mixture is at room temperature add 5 cc. of carbon tetrachloride, and titrate the red color, with tenth normal thiosulphate solution with vigorous agitation, until it is of the same milky color as a blank which should be run at the same time, using either corn or cottonseed oil.

The reason for selecting 7.05 grams of oil as a unit is because two samples of oil can be weighed at the same time for different determinations, one for the free fatty acid, and the other for the thiosulphate number.

Proposed Thio Numbers

RECENTLY a sample of oil marked "Olive Oil" gave a thio no. of 1.59. The iodine value was determined and found to be 134.0. This unknown indicated that the thio no. could be used to detect olive oil in a mixture containing from 5% to 10% olive oil in other oils.

It would seem that from the above figures the limits for a virgin oil would vary from 4 to 4.5 thiosulphate number, for refined deodorized oils from 3.50 to 4.00, and for untreated bleached foots oil from 5 to 6. These numbers are arbitrary and only a suggestion for experimental work.

The chart shows very little difference in the index except with the rapeseed and the mixture of 90% rapeseed and 10% olive oil. The

(*Turn to page* 33)

Experimental Data

	Thio No.	Iodine No.	Valenta Index	Coin Test	F.F.A.
Marked Virgin oil	3.69 cc.	86.3	1.4629	Negative	0.45%
" " "	4.28 "	82.7	1.4635	"	0.40%
" " "	4.48 "	86.5	1.4620	"	0.50%
" Pulp Ref. Deo.	3.23 "	87.0	1.4620	Positive	0.45%
" French Ref.	3.90 "	87.4	1.4630	Negative	0.48%
" Rapeseed	0.00 "	104.3	1.4675	"	0.50%
(10% Olive Oil and 90% Rapeseed Oil)	1.59 "	102.9	1.4670	"	
(90% Olive Oil and 10% Rapeseed Oil)	4.78 "	87.1	1.4640	"	
Unknown Olive Oil	5.28 "	84.8	1.4630	"	0.70%
" " "	3.48 "	82.4	1.4630	"	0.50%
" " "	5.48 "	84.6	1.4632	Positive	0.40%
" " "	6.18 "	87.9	1.4623	"	3.40%

Senators Renew Proposals For Higher Oil Duties

Jones and Thomas Offer Amendments From Senate Floor

THE never-ceasing fight to place prohibitive tariff rates on the importation of all classes of foreign animal and vegetable oils is now being prosecuted from the floor of the Senate itself, according to the Washington service of *"Oil & Fat Industries"* and *"Soap."*

Repeatedly defeated in Committees of both the House of Representatives and the Senate, the effort has now taken the form of Senate Floor Amendments. Not content with placing prohibitively high specific duties on all the oils which they could list by name, the proponents of these advances have provided a blanket clause which would tax all listed oils at 45% ad valorem, if such rate should be higher than the specific rate, and a second blanket clause taxing all other animal, fish and vegetable oils, not specially provided for, at 45% ad valorem.

The proposed amendments are quoted in full as follows:

Amendment

Proposed by Mr. Jones to the bill (H.R. 2667). On pages 23-34 strike out all of paragraph 53 and insert the following:

Par. 53. Oils, animal and fish: Cod, herring, and menhaden, 2 cents per pound; whale, 2-7/10 cents per pound; seal, 2-4/10 cents per pound; sperm, crude, 2-2/10 cents per pound; sperm, refined or otherwise processed, 4-4/10 cents per pound; cod, 3 cents per pound; cod-liver, 5-6/10 cents per pound; spermaceti wax, 6 cents per pound; wool grease containing more than 2 per centum of fatty acids, 1 cent per pound; wool grease containing 2 per centum or less of fatty acids and not suitable for medicinal use, including adept lanae, hydrous or anhydrous, 3 cents per pound: PROVIDED, That the rate of duty on all of the foregoing oils and fats shall in no case be *less* than 45 per centum ad valorem; all other animal and fish oils, fats, and greases not specially provided for, 45 per centum ad valorem.

Amendments

Proposed by Mr. Thomas of Idaho to the bill (H.R. 2667).

On page 24, strike out lines 10 to 19, inclusive, and insert the following:

Par. 54. Oils, vegetable: (a) Castor, 5 cents per pound; hempseed 4-1/2 cents per pound; poppy seed, 8-8/10 cents per pound; rapeseed, 3-7/10 cents per pound; palm, 3-7/10 cents per pound; perilla, 4-6/10 cents per pound; sweet almond, 3-4/10 cents per pound; tung, 5-9/10 cents per pound; vegetable tallow, 3-1/10 cents per pound;

(b) Olive, rendered unfit for use as food or for any but mechanical or manufacturing purposes, by such means as shall be satisfactory to the Secretary of the Treasury and under regulations to be prescribed by him, sulphured or foots, 3-9/10 cents per pound; all other, 7-1/2 cents per pound; olive, not rendered unfit for use as food or for any but mechanical or manufacturing purposes, weighing with the immediate container less than forty pounds, 10-4/10 cents per pound on contents and containers;

(c) none of the foregoing shall be subject to a *less* rate of duty than 45 per centum ad valorem;

(d) linseed or flaxseed, and combinations and mixtures in chief value of such oil, 4-1/2 cents per pound, but not *less* than 55 per centum ad valorem;

(e) all other expressed or extracted oils, not specially provided for, 45 per centum ad valorem.

On page 264, line 20, strike out the comma following the word "Croton," and in line 21 strike out the words "palm, perilla, and sweet almond."

Amendment

Proposed by Mr. Thomas of Idaho to the bill (H.R. 2667). On page 24 strike out lines 20 to 24, inclusive, and insert in lieu thereof the following:

Par. 55. Coconut oil, 3-6/10 cents per pound; cottonseed oil, 3-6/10 cents per pound; peanut oil, 5-4/10 cents per pound; palm-kernel oil, 3-6/10 cents per pound; sesame oil, 5-4/10 cents per pound; and soy-bean oil, 2-8/10 cents per pound:

PROVIDED, That none of the foregoing shall be subject to a less rate of duty than 45 per centum ad valorem.

Differential Halogen Absorptions

IT IS claimed that the bromine vapor method of determining the degree of unsaturation of fats and oils compares favorably with the Wijs iodine method, is more rapid and often more complete. The chlorine, bromine and iodine absorptions of the following fats and oils were determined: tung oil and eleostearic acid, linseed oil, rubberseed oil, soy bean oil, coconut oil, corn oil, olive oil, almond oil, whale oil, cod-liver oil, castor oil and ricinoleic acid, peanut oil, fatty acids from peanut oil, oleic acid, fatty acids from parsley seeds, crotonic acid, tiglic acid, maleic acid, fumaric acid, cinnamic acid, cinnamic alcohol, croton oil and the fatty acids from croton oil.

Castor oil and ricinoleic acid absorb more chlorine or bromine than corresponds to the iodine absorption of the Wijs method, probably because of the halogen being substituted for hydrogen as well as absorbed at double bonds. It is suggested that the difference between the values obtained by one hour's absorption by the Wijs and bromine vapor methods may help to indicate the position of the unsaturated bond in the fatty acids of the oleic series. The experiments with substances not oils or fats showed, in general, that the chlorine vapor and bromine vapor methods gave results agreeing closely with the theory except with maleic and fumaric acids, which were very inert under this treatment. *Analyst* 54, 445-53 (1929).

An attempt to establish a factorial relationship between the titer and the refractive coefficient of oils has been unsuccessful, hence it is concluded that hydrogenation cannot be controlled by the refractive index determination. *Maslob, Zhir. Delo* 1928, No. 7, 27-9.

An unconditional most-favored-nation treaty signed between France and Turkey on August 29 carries a reduction in existing rates of twenty percent on coconut oil imports from the former to the latter country. The United States will also receive the benefit of the decrease as this country is a party to the treaty.

Russell Acree, Secretary of the South Carolina Division of the National Cottonseed Products Association, died at his home in Columbia, South Carolina, on October 16. He was a prominent and esteemed member of the Association, formerly engaged in the oil milling business at Darlington, South Carolina.

New Books

THE Fourteenth Annual Edition of the Chemical Engineering Catalog has just been issued by its publishers, The Chemical Catalog Company, 419 Fourth Avenue, New York City. This catalog has become the standard text for equipment purchase reference among chemical manufacturers generally, and the current issue surpasses all previous numbers in variety of equipemnt and chemicals listed. The catalog is mailed free of charge, on the understanding that it is to be returned upon publication of the succeeding edition, to chemists, chemical engineers, works managers, superintendents and others actually engaged in executive work in the chemical industries.

A prominent firm of chemical manufacturers in New York is offering the trade a complete line of anti-oxidants, for the retardation of oxidation in fats, oils, soaps and other products. It is claimed that these products retard the development of the properties of rancidity, which in some cases are attributable to oxygen absorption. The anti-oxidant materials are oil soluble and may be incorporated directly with the fat or oil to be treated. If desirable they may be used in the form of a solution in a suitable organic solvent. In the case of soaps, it is preferable to add the anti-oxidant to the fat before saponification because subsequent decoloration is minimized by this procedure.

The following data obtained with cottonseed oil and cottonseed oil soap are typical as showing retardation or prevention of oxidation by means of anti-oxidants. After exposure of the samples to pure oxygen observations and determinations were made of the volume of oxygen absorbed, the increase if any in free fatty acid, the odor and the color.

Test No. 1—Cottonseed Oil

A—Control—No anti-oxidant
B—Control plus 0.2% anti-oxidant B
Exposed to pure oxygen at 80°C. for 72 hours.

	Oxygen Absorbed	Acidity (% oleic acid) Initial	Final	Gain	Odor After Test	Color After Test
A	1000 cc.	0.15	1.76	1.61	Rancid	Dark
B	110	0.15	0.62	0.47	Trace of Rancidity	No change

Test No. 2—Cottonseed Oil Soap

C—Control—No anti-oxidant
D—Control plus 0.2% anti-oxidant A
E—Control plus 0.2% anti-oxidant B
Exposed to pure oxygen at 50°C. for 24 hours

	Oxygen Absorbed	Acidity (mg. KOH per gm.) Initial	Final	Gain	Odor After Test	Color After Test
C	1050 cc.	0.0	11.2	11.2	Rancid	Very Dark
D	0	0.0	0.0	0.0	Sweet	No change
E	0	0.0	0.0	0.0	Sweet	No change

Notes of the Industry

Meat Packers Convention

THE American Institute of Meat Packers held its twenty-fourth annual convention, at Chicago, October 18-23. The sessions were held at the Drake Hotel, under the Chairmanship of F. S. Snyder, Chairman of the Board of Directors of the Institute. The major interest of the members attending was directed toward the adoption of a code of trade practices, which was the culmination of months of effort on the part of members of the Institute to set up a code of business conduct in line with recommendations made at the 1928 convention.

Other subjects discussed included the new quick-freezing process which gives promise of revolutionizing the methods of meat distribution; the education of the cattle raiser in methods of raising better meat animals; the relation of the chain store to the meat packer and the manner in which such relations affect retail distribution of the packer's products; the improvement of production and merchandising of lard and its standardization; and the education of the consuming public in the proper appreciation of the value of meat in the diet.

The officers and directors elected for the coming year were as follows: Chairman of the Board—F. S. Snyder, Boston, Mass., President—William Whitfield Woods, Chicago. Vice-Chairmen—E. A. Cudahy, Jr., Chicago. D. C. Dickinson, Philadelphia. Jay C. Hormel. Austin, Minnesota, Chester Newcomb, Cleveland, Ohio, A. T. Rohe, New York; Treasurer—Henry Neuhoff, Nashville, Tennessee.

The Vegetable Oil Corporation is erecting a large copra crushing mill at Wilmington, California. It is planned to augment the plant at a later date with machinery for handling cottonseed, sesame seed and other products. The company is preparing to introduce two new shortenings as additions to its present lines of refined coconut oil and margarines.

Experiments by the British government in the growing of tung trees in Ceylon have not been satisfactory. Plantings at Hakgala, Peradeniya and Heneratgoda have made poor showings. Somewhat better results have been obtained at Etvawalla.

In an opinion handed down by Judge Brown of the United States Customs Court, the protests of a Philadelphia importer claiming stearic acid dutiable at 1¼c per pound, were overruled. Stearic acid is classified as dutiable at 25% ad valorem under paragraph one of the Tariff Act of 1922.

Much of the Tunis olive oil producing area was dry during July, siroccos being prevalent and causing considerable damage. Throughout three of the major producing regions, high temperatures and the occurrence of hail storms were responsible for fruit dropping from the trees. On the whole, however, and taking into account the two remaining regions, the crop appears to promise a good volume of fruit. In one region in particular, despite damage from hailstones, the crop was pronounced excellent. *Consular Report.*

M. F. Austin, Manager of the Vegetable Oil Department of W. R. Grace and Co., New York, is now traveling in Japan. He is expected to return to New York early in December.

Bids are being sought for the construction and equipment of a proposed margarine factory at Colombo, Ceylon. The proponents of the project have announced that they propose to install American equipment and adopt American methods of manufacture. British India is regarded as a promising outlet for the margarine produced at this plant, in view of its proximity and the much reduced cost of manufacture as compared with the European product.

The Annual Meeting of the American Association of Textile Chemists and Colorists will be held at the Bellevue-Stratford Hotel in Philadelphia on December 6th and 7th. On Friday, December 6th, the executive council will meet in the afternoon, followed by an open meeting the same evening. All day Saturday, December 7th, will be devoted to the business of the Association and the reading of technical papers related to the industries in which the members are interested, particularly the textile industry. The meeting will close with the Annual Banquet on Saturday evening.

The Archer-Daniels-Midland Company, linseed oil producers, of Minneapolis, have acquired a substantial interest in the Werner G. Smith Company, large importers of china wood oil, of Cleveland, Ohio. The Directors of the Archer-Daniels-Midland company have voted to extend their stockholders the right to subscribe at thirty dollars per share for one new share of stock for each seven shares owned, the proceeds of this subscription to be used to acquire the interest in the Smith company.

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of Oil & Fat Industries, published monthly at New York, N. Y. for October 1, 1929.
State of New York; County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Alan Porter Lee, who, having been duly sworn according to law, deposes and says that he is the Editor of the Oil and Fat Industries and the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, MacNair-Dorland Co., Inc., 136 Liberty St., N. Y. C.; Editor, Alan Porter Lee, 136 Liberty St., N. Y. C.; Managing Editor, none; Business Managers, Grant A. Dorland, 136 Liberty St., N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) MacNair-Dorland Company, Inc., 136 Liberty St., N. Y. C., Grant A. Dorland, 136 Liberty St., N. Y. C., Ira P. MacNair, 136 Liberty St., N. Y. C.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

[Signed] Alan Porter Lee.

Sworn to and subscribed before me this 30th day of September, 1929.

Al. J. Ruggiero, Notary Public, Kings Co., No. 509 Reg. No. 1162; Cert. filed in N. Y. Co., No. 309 Reg. No. 1R242; Commission expires March 30th, 1931. [SEAL.]

Mayonnaise Industry

(*From page* 18)

purchased of practically equal quality and comparable price. There is much yet to be learned regarding problems of distribution along the lines brought out in this report, and in similar ways. Much educational work must be done before all the manufacturers see the value of such investigations, and are ready to help themselves by helping others. The association, as representing the industry can do many of these things with the cooperation of the manufacturers, both members and non-members, and, now, as before, the Department of Commerce is glad to assist in any way compatible with its duties and abilities.

Distribution

"THE current talk that distribution people are old fogies and that their difficulties are due to their being sound asleep is unfounded," said Gorton James, Editor of *The Business Week*, speaking at the meeting of Mayonnaise Products Manufacturers' Association at their annual convention at Atlantic City. He went on to say that conditions have changed faster than human institutions can be altered, and with changing conditions must come changed distribution methods. The proportion of families living in apartment houses has increased from 1/3 in 1922 to over 2/3 in 1929. Where there were approximately 35,000 chain store units in 1922, the number in 1929 is about 105,000.

Olive Oil Test

(*From page* 27)

iodine values all come within the limits of the U.S.P.[2] except the rapeseed and the 90% rapeseed mixture. Presumably the Thio Numbers, would indicate that olive oil above 4.50 and below 3.50 should be investigated to determine the purity of the oil. It has been found recently by another observer that olive oil gave a pink or red color, pecan oil and grape fruit seed oil a pale pink, cottonseed, sunflower, soya bean, linseed and china wood oils did not give a pink or red color with the above reagents. If sesame oil is present in the olive oil the red color will appear in the cold, and then there is no need for the thio number. When an olive oil contains oil of rosemary, it should be extracted with alcohol to remove the essential oil.

(*) The American Journal of Pharmacy 95,-684 (1923).
(1) The thio number of the olive oil used in the Rapeseed oil mixture.
(2) United States Pharmacopecia (Tenth Revision).

ABSTRACTS

David Wesson, *Abstract Editor*

The theory of the gelation and reliquefication of wood oil has been discussed in the light of the methods employed in commercial practice to retard gelation. Gelation of wood oil appears to begin with an esterification in which glycerol is taken up, accompanied or followed by polymerization and condensation during which glycerol is eliminated. The changes of colloidal character are of a secondary nature. Linseed oil or its fatty acids and rosin are considered to hinder gelation by esterification, mixed glycerides being formed. The liquefying action of inert substances such as mineral oils is thought to be one of simple syneresis. *Chem. Umschau Fette Ocle Wachse Harze* 36, 35-8 (1929).

Malodorous substances may be removed from wool fat by esterification with an alcohol such as methyl or ethyl alcohol in the presence of concentrated sulfuric acid or other concentrated inorganic acid. Brit. Pat. No. 303,890.

Montan wax, crude or deresinified, may be refined with oxidizing agents such as hydrogen peroxide or chromic acid or its derivatives in the presence of aqueous sulfuric acid. Diluents or dispersing agents such as silicic acid, clay or carbon tetrachloride may be used to prevent thickening. Brit. Pat. No. 303,036.

The age as well as the source of an olive oil must be considered in determining its purity from its iodine value. Determinations of the iodine numbers of oils from Sorrento, Lucca and Bari show some variation, which is not, however, much greater than the variation due to the age of the oil. An olive oil of iodine value of 103.4 will show a value decreased to 99.0 in two years of aging. *Ann. Chim. Applicata* 19,98-107 (1929).

A newly patented method of bleaching oils with activated clays comprises intimately mixing the oil with water, heating the mixture to a temperature not exceeding 43°, removing the water and associated substances, bringing the oil into intimate contact with the activated clay, and final separation of the clay. U. S. Pat. No. 1,725,895.

The determination of the thiocyanogeniodine value combined with the iodine number offers the possibility of obtaining an insight into the linoleic acid and linoleic glyceride content of fats which are free from linolenic acid. The lowering of the iodine number in the partial hydrogenation of soy bean oil is accompanied by a lowering of the thiocyanogeniodine value. The total decrease of the iodine number on one sample tested amounted to 71.8; that of the thiocyanogeniodine number to 26.5. The decrease of the difference between the iodine number and the thiocyanogeniodine number was 45.3 or almost 80% calculated on the initial difference. It is noted that the hydrogenation of the unsaturated compounds which are not saturated by thiocyanogen, but are saturated by iodine chloride, predominates. The hydrogenated products contain much less linoleic acid than the original soy bean oil. *J. Soc. Chem. Ind.* 48, 79-80T (1929).

It is claimed that Herbig's proposal to multiply by two the results in the organic sulfur trioxide determination of sulfonated oils (since $1SO_3=2KOH$) is incorrect, because the determination refers to the group HSO_4 instead of SO_3 and $1HSO_4=1KOH$. *Chem. Umschau Fette, Oele,Wasche Harze* 35,290-1 (1928).

Vitamin-bearing oils may be obtained from fish livers as follows: livers such as those of the cod are cooked at a temperature not exceeding 100° while under sub-atmospheric pressure until the livers are disintegrated and the oil freed from them; an inert gas such as nitrogen or carbon dioxide is introduced above the mass to break the vacuum and exclude air, the mass is cooled while permitting it to separate into strata, the upper layer of oil is decanted and stored under an inert gas. U. S. Pat. No. 1,725,964.

Fatty or mineral oils may be treated with decolorizing earths by a continuous method in which the oil and the earth are fed in predetermined proportions to a mixer in such a way that fresh oil meets fresh earth, the mixture being continuously withdrawn. Ger. Pat. No. 480,345.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of			
40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing			
36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing			
36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.15½	.15¾
Coast, tanks, spot	lb.	.14	.14¼
Futures	lb.	.13½	.13¾
Coconut, Ceylon grade, bbls.	lb.	—	.08¼
Coast, tanks	lb.	.06¾	.07
Cochin grade, bbls.	lb.	.08¾	.09
Manila, bbls.	lb.	—	.08¼
Tanks, N. Y.	lb.	.07	.07⅛
Coast, tanks	lb.	.06¾	.07
Fatty acids, mill, tanks	lb.	.10½	Nom.
Cod, Newfoundland, bbls.	gal.	.59	.60
Copra, bags, coast	lb.	.04⅜	.04½
Corn, tanks, mills	lb.	.08	—
Bbls., New York	lb.	.10	Nom.
Refined, bbls.	lb.	.10½	Nom.
Fatty acid	lb.	.08¾	Nom.
Cottonseed, crude, tanks, mill	lb.	.07¼	.07⅜
P. S. Y.	lb.	.09	.09½
Fatty acids, mill, bbls.	lb.	.09	Nom.
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.04½	.05
German, bbls.	lb.	.07	.07½
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bbls.	lb.	.07	.07½
Greases, choice white, bbl. N. Y.	lb.	.07½	.09
Yellow	lb.	.06⅞	.07
Brown	lb.	.06¾	.06⅞
House	lb.	.06⅞	.07
Bone Naptha	lb.	.06¾	—
Herring, coast tanks	gal.	—	Nom.
Horse, bbls.	lb.	.09½	Nom.
Lard, city, tierces	lb.	.11	—
Compound, tierces	lb.	.11	.11¼
Middle Western, tierces	lb.	.12¼	—
Neutral, tierces	lb.	.13	Nom.
Prime Western, tierces	lb.	.11½	—
Lard oil, No. 1, bbls.	lb.	.11¾	—
No. 2, bbls.	lb.	.11½	—
Extra bbls.	lb.	.12½	—
No. 1, bbls.	lb.	.12	—
Winter strained, bbls.	lb.	.12½	—
Prime, bbls.	lb.	.15	—
Linseed Oil, boiled, tanks	lb.	.1510	—
Car lots, bbls.	lb.	.1590	—
Less car lots, bbls.	lb.	.1630	—
Less than 5 bbls.	lb.	.1670	—
Double boiled, less than 5 bbls.	lb.	.1700	.1730
Raw, tanks	lb.	.1470	—
Car lots, bbls.	lb.	.1550	—
Less car lots, bbls.	lb.	.1590	—
Less than 5 bbls.	lb.	.1630	—
Calcutta, bbls.	lb.	.2200	—
Refined, bbls.	lb.	.1620	.1660
Varnish grades, bbls.	lb.	.1640	.1680
Linseed cake, bags	ton	48.00	—
Meal bags	ton	57.00	—
Menhaden, crude, tanks, Baltimore	gal.	.48	—
Light pressed, bbls.	gal.	.67	.70
Yellow bleached, bbls.	gal.	.69	.72
White bleached, bbls.	gal.	.72	.75
Mustard, bbls.	gal.	.85	.90
Neatsfoot, cold pressed, bbls.	lb.	.18½	—
Extra, bbls.	lb.	.12¼	—
No. 1, bbls.	lb.	.12	—
Pure, bbls.	lb.	.14½	—
Oleo, No. 1, bbls.	lb.	.11¼	—
No. 2, bbls.	lb.	.10¼	—
No. 3, bbls.	lb.	.10	—
Olive, denatured, bbls. N. Y.	gal.	1.00	1.10
Shipments	gal.	.97	1.00
Foots, bbls.	lb.	.08¾	.09¼
Shipments	lb.	.08	.08½
Edible, bbls.	lb.	2.00	2.30
Palm, Lagos, casks, spot	lb.	.07⅝	.07¾
Shipments	lb.	.07½	—
Niger, casks, spot	lb.	.07⅜	.07½
Shipments	lb.	.07¼	—
Palm Kernel, pkgs.	lb.	.08¼	.08½
Tank cars	lb.	.07¾	—
Peanut, crude, bbls.	lb.	.11½	Nom.
Mills, tanks	lb.	.08½	Nom.
Refined, bbls.	lb.	.13¼	Nom.
Perilla, bbls.	lb.	.17	Nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.00	1.02
Refined, bbls.	lb.	.78	.80
Red Oil, distilled, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Saponified, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Salmon, coast, tanks	gal.	.44	Nom.
Sardine, coast, tanks.	gal.	.48	—
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13½	.13¾
Crude, bbls.	lb.	.12½	.12¾
Orient, coast, tanks	lb.	.11	.11¼
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15¾	.16½
Triple pressed, bags	lb.	.18¼	.18¾
Stearine oleo, bbls.	lb.	.10¼	.10½
Tallow, edible, bbls	lb.	.09	.09¼
City, extra, works, loose	lb.	.08¼	—
Special, works, loose	lb.	.08	—
Tallow oil, acidless, bbls.	lb.	.11	—
Tanks, N. Y.	lb.	.10¾	—
Vegetable tallow, coast, mats	lb.	.07¾	Nom.
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Market Report on

FATS, OILS AND GREASES

(*As of November* 1, 1929)

NEW YORK—The trend of prices for oils, fats and greases during the recent period was downward, as demand failed to assert itself in any large way. The collapse of the securities markets toward the close of the period weakened the commodity markets and contributed to the general decline. The cottonseed oil and linseed oil markets were particularly affected by the break in the securities market which caused a withdrawal of funds from the buying side. Coconut oil moved upward in price contrary to the general direction of the market, as a result of depleted stocks and good inquiry. Chinawood oil was also strong at the close due to shortness of stocks. Corn oil was quoted lower as offerings increased. Grease and lard followed the same downward course. Olive oil prices held firm, but palm oil declined fractionally. Tallow was quoted lower in a quiet market.

Chinawood Oil

Although quoted under the closing price of last period this oil is considered in firm position by domestic buyers. Stocks in China and on the West Coast are short, in the face of good demand here. It is reported that the foreign situation has not eased off any, making it impossible to predict an advance in shipments.

Coconut Oil

Coconut oil continued in firm position, advancing ⅛c to ¼c lb. on all items in the list early in the period, and continuing steady throughout. Offerings from importers were light.

Corn Oil

New offerings of crude corn oil, due to weakness in the grain market, depressed the price of crude oil. It was quoted at 8c lb. in tanks at the mill as the market closed.

Cottonseed Oil

Cottonseed oil was in firm position throughout the period until just before the close, when a collapse in the securities market demoralized the commodity markets as well. This was considered a technical adjustment, as unfavorable weather conditions in the South have cut down the size of the crop somewhat, making higher prices in order. Closing quotations on crude oil after the disastrous stock market break were 7¼c to 7⅜c lb.

Grease

Grease was quoted ½c lb. lower on all grades at the close, as a result of competition among sellers for the business.

Lard

This market was easier, with a small amount of business being done, and quotations lower. Routine filling of current requirements was about the only way in which domestic demand showed itself. Foreign buying continued in fair volume.

Linseed Oil

More favorable crop reports caused a recession in price of flaxseed from recent high levels, bringing a decline in linseed oil prices. Unfavorable developments on the stock exchanges also contributed to the drop. Quotations were 4/5c lb. lower on all grades at the close.

Olive Oil

Prices were steady in the olive oil market. A fair amount of business was done, with demand being for small lots in most cases.

Palm Oil

Palm oil prices were shaded slightly during the period, as the volume of business declined.

Tallow

Prices were lower on tallow in step with the rest of the market. Domestic business was routine, and export demand was quiet.

Armour and Company and subsidiaries, including the North American Provision Company have filed a complaint with the Interstate Commerce Commission asking lower carload freight rates on vegetable oil foots, sediment, tankbottoms, soapstock, inedible tallow, and inedible greases from refineries at Chicago, Kansas City, Fort Worth and Oklahoma City to destinations in Illinois, Iowa, Missouri, Wisconsin, Indiana, Kentucky, Kansas, Colorado, Nebraska, Minnesota, Ohio, Oklahoma and Texas.

For September the Glidden Company reports sales aggregating $3,619,745, against $2,366,131 in September, 1928, an increase of 53 per cent.

OIL & FAT INDUSTRIES

The Editor's Page

Margarine—A Pure Food

THE reports of the Internal Revenue Bureau, which has control of the taxation of margarine, as well as those of the Census of Manufactures, show a steady healthy growth in the production of this food product throughout the past several years. This growth is particularly notable because it is being accomplished in the face of the most virulent, bitter and venomous warfare ever waged against a clean, wholesome food by prejudiced and fanatical competitors. Margarine is *clean*, is prepared in modern factories under the strict sanitary regulations of two departments of our Federal government, the Department of Agriculture and the Treasury Department, who dictate relentlessly what materials may be used in its production.

There is a steady demand in this country for a cooking and table fat of good quality and flavor, at a price somewhat lower than the very fancy figure commanded by butter. The consumer knows that clean margarine is pure, sweet, wholesome and healthy. The producers of butter know that the population of this country is increasing at a rate more than double the rate of increase of the dairy herds on the farms. They know, too that their own efforts to increase the consumption of milk, condensed milk, cream, cheese, milk chocolate and other milk products have been so successful that the farmer is able to obtain much higher prices for his milk than ever before. They know that thousands of ice-cream manufacturers will pay fancy prices for all the butter they can obtain in June for storage against their summer and Autumn requirements. Despite these facts the organized dairy interests are constantly endeavoring to obtain additional class legislation against margarine from the legislatures of all the states and from the Congress.

The avowed purpose of these fanatical adherents of the dairy cow is to legislate margarine out of existence, thus depriving many working men and their families of a clean, healthy food fat, moderately priced. The butter people know that they themselves color all butter, except the choicest June butter, with harmless artificial coloring, yet the legislation which they have succeeded in obtaining from Congress places a prohibitive tax upon the margarine manufacturer who desires to follow the same procedure. At every meeting of every state legislature many measures are introduced which are designed to impede even further the manufacture and distribution of this food product. Yet we know of many, many instances in which dairy farmers have regularly taken their butter to market and taken home margarine for their own and their families' use.

There is only one recourse open to the margarine manufacturers, but this remedy stands clearly defined. It is to be found in a campaign of cooperative educational advertising directed to the housewives of America, who, once they know the true facts, will demonstrate the inherent fairness of our people by giving margarine even greater support than in the past. Such a campaign, to be effective, must be national in scope, but the expenditure will be well repaid by increased sales. We understand that the Institute of Margarine Manufacturers has taken the first steps in this direction. Let the good work go on!

The Era of Distribution

AMERICAN industries, during the past twenty years, have been passing through a period of production adjustment. The inventive genius of the nation has been directed toward the solution of problems of production, the elimination of needless waste, the bulwarking of man power with machine effort, the improvement of quality and the reduction of manufacturing costs. How well these objectives have been reached is shown by the fact that in all lines where quantity production is a factor, American products lead the world in quality, in low production cost, and in volume. This efficiency in production has made the United States the wealthiest nation ever known in the history of the world, and as a direct result, the happiest, for in our country the average man of today enjoys comforts and luxuries which were beyond the reach of the

wealthiest princes of the old world, even as little as a hundred years ago.

Distribution, however, has failed to keep pace with production, with the result that the savings in cost achieved by modern methods in the factory are frequently offset by the extreme cost of transporting and marketing the products of the ultimate consumer.

That this situation is attracting the notice of our industrial leaders is evidenced by the character of recent developments in the field of industry. Whereas in former mergers of large businesses invariably included companies making competitive products, and as invariably resulted in concentration of manufacturing operations for the purpose of increasing plant volumes and reducing unit costs of production; more recently mergers have been obviously designed to reduce distribution costs, by adding plants which are able to serve different sections of the country economically, or by combining businesses producing products quite dissimilar, but with allied distribution needs.

This trend has been particularly apparent in the food industry, where production problems for various lines are often widely unlike, but where marketing and distribution requirements are identical, or practically so, throughout the industry. Our country has undoubtedly grown to the stage where national distribution from a single manufacturing unit in the food industry is almost impossible, so that we may expect to see even more of these "distribution mergers" as population increases in numbers and density throughout America.

Foreign Trade Opportunities

The Bureau of Foreign and Domestic Commerce of the Department of Commerce announces that its representatives in all parts of the world have forwarded the following trade inquiries of interest to our readers. In writing the Bureau in reference to any of these inquiries please mention that you saw it in *Oil & Fat Industries*.

No.	Location	Material	Purchase or Agency
42389	Switzerland	Cottonseed and linseed cake	Purchase
42377	England	Cottonseed and linseed cake	Agency
42391	Germany	Lard and bacon	Purchase
42215	Germany	Lard	Purchase
42221	Norway	Lard and oleo	Either
42205	Denmark	Tallow	Agency
42046	Germany	Fish oils	Purchase
42161	Germany	Neat's-foot oil	Purchase
42047	Canada	Salad oil	Purchase
42153	Denmark	Oleine	Purchase

Oil Content of Straits Copra

A RECENT issue of the Malayan Agricultural Journal contains a report of a number of analyses undertaken to determine the oil content of copra exported from the Straits

It appears that importers in London have registered complaint that whereas formerly Straits' copra contained 66/67% of oil yielding 63/64%, it had been observed that of late the oil content had dropped to 63/64%, or an actual oil yield of 60/61%. This decided the government to conduct a series of tests based on samples from six estates drawn at monthly intervals and representing actual exports of copra, the samples being taken from the actual sacks in which the copra was to be shipped, before the sacks were stitched. One result of these analyses was the determination of an average moisture content of 7%, and as regards oil content, it was ascertained that copra calculated on a moisture free basis averaged approximately 66%. It became possible, as a result of these tests, to demonstrate that an increase of 1% in moisture content of the copra would mean a corresponding decrease of from 0.6 - 0.7% of oil and while these analyses may not be regarded as entirely conclusive, they did show that the oil content in most of the Straits' copra was higher than had been reported from London recently.

Why a Cut?

JUST at the time when the weekly bulletin service of the Meat, Oils and Fats Section of the Department of Commerce reaches its greatest value to American consumers of oils and fats, especially the soap industry, the service is suddenly cut about in half. The weekly reports on primary markets for oils, fats, and allied products had been expanded gradually over the past year and had supplied an ever increasing amount of valuable data to American industry. Then, recently, came a cut in the size of each individual bulletin and apparently a complete elimination of the service during some weeks. Governmental departments sometimes do things which are difficult to understand, and this seems to be one of them. This service in its previously expanded form gave a host of facts which could not but be of great help to consumers of oils and fats. Why cut it down just when its value becomes greatest?

Oil Chemists Fall Meeting

Third Annual Autumn Session Scheduled for New York on November 14th and 15th

THE New York Committee of Arrangements, H. P. Trevithick, *Chairman*, announce that a complete and interesting program for the Third Annual Fall Meeting of The American Oil Chemists' Society has been assembled. The Meeting will be held at the Hotel McAlpin, Broadway and 34th Street, New York City, on November 14th and 15th. A. K. Church, Vice-President of the Society and Chairman of the Soap Section, will preside. A new feature of the Meeting, one which is expected to create considerable added interest, is the exhibition of laboratory apparatus and materials for plant use which has been arranged by a number of leading industrial organizations. The corporations and firms exhibiting will include: Christian Becker, Inc., L. A. Salomon and Brother, Bausch and Lomb Optical Co., Darco Sales Corporation, Emil Greiner Co., Eimer and Amend, Fred S. Carver, Pfaltz and Bauer, Industrial Chemical Sales Co., Laboratory Construction Co. The complete program as issued by the Arrangements Committee is given as follows:

THIRD FALL MEETING
of
THE AMERICAN OIL CHEMISTS SOCIETY

Hotel McAlpin — New York City
November 14-15, 1929

PRESIDENT

W. R. Stryker ..... New Orleans, La.

VICE-PRESIDENTS

W. H. Irwin ..... Chicago, Ill.
A. S. Richardson ..... Cincinnati, Ohio
C. W. Rice ..... Columbia, S. C.
A. K. Church (also Chairman Soap Section) Boston, Mass.

SECRETARY-TREASURER

J. C. P. Helm ..... New Orleans, La.

SECRETARY SOAP SECTION

W. A. Peterson ..... Brooklyn, N. Y.

Official Journals

"Oil and Fat Industries," "Soap" (for Soap Section)—Alan Porter Lee, Editor, New York

A. K. CHURCH
Vice-President, A. O. C. S.

GOVERNING COMMITTEE

W. R. Stryker, *Chairman*

J. J. Vollertsen	W. H. Irwin
R. H. Fash	A. S. Richardson
H. P. Trevithick	C. W. Rice
A. W. Putland	A. K. Church

REFEREE BOARD

W. H. Irwin, *Chairman*

Felix Paquin	Herman Aspegren
L. C. Haskell	W. R. Stryker

Local Committee

H. P. Trevithick, *Chairman*

R. W. Bailey	David Wesson
W. A. Peterson (Secretary)	Alan Porter Lee

ANNOUNCEMENTS

1: THE THIRD FALL MEETING of The American Oil Chemists' Society will be held in the Colonial Room of the Hotel McAlpin, 34th St. and Broadway, New York City, November 14-15th, 1929. The meetings will start promptly at 10:00 A. M.

2: VISITORS AND GUESTS will be welcomed.

3: Our Associate Members are also invited to attend the meetings.

4: Visits to places of interest to the members will be arranged as desired.

5: The Hotel McAlpin will be the headquarters. Please make your hotel reservations at this hotel while attending this convention, as the management is doing all in its power to make this convention a success. When making reservations, use the card furnished with the first notice of this meeting, or else mention that your reservation is for this meeting.

6: The meetings of the various committees will be announced at the meeting.

7: A special invitation is extended to soap chemists and executives. This meeting is in charge of the soap section of the society.

8: An informal get-together lunch will be held immediately after the first day's meeting, in a private dining room of the Hotel McAlpin. The charge will be $2.00 a plate and Dr. Wesson, of Wesson oil fame, will be the toastmaster.

9: An informal discussion on detergency in general will take place at a meeting of the detergent committee in connection with the convention. At this meeting of this committee, others who are interested will be welcomed. The time and place will be announced at the convention.

10: An exhibition of chemical apparatus, fuller's earths, carbons, and other materials of interest to oil and soap chemists will be given in the anteroom of the Colonial Room during the meeting. This is a new departure and we believe that it will prove very interesting.

Program in Detail

THURSDAY NOVEMBER 14, 1929

Meeting called to order at 10:00 A. M. (sharp) H. P. Trevithick.

Meeting opened for business, and in charge of A. K. Church, 4th Vice-President and Chairman of the Soap Section.

Reports of various committees.

Report of the Soap Section (soap and glycerine) W. A. Peterson, Sec.

Paper: Historical Aspects of Vegetable Oil Refining. Dr. David Wesson, Technical Director, Southern Cotton Oil Co.

Paper: The Composition of Porpoise Jaw Oil. Dr. Augustus H. Gill, Professor of Technical Analysis, Massachusetts Institute of Technology.

Paper: The use of the Bömer Test in differentiating Lard and Lard Compounds. H. P. Trevithick and M. F. Lauro.

Paper: The Development of the Wood Rosin Industry. E. V. Romaine, Technical Director, General Naval Stores Co.

Paper: Precision Color Measurement with a new Photo-Electric Instrument by H. D. Ellsworth. The instrument will be demonstrated at the meeting.

Luncheon at 1:30 P. M. at the Hotel McAlpin

Dr. David Wesson, Toastmaster

Detergent Committee meeting at 3 P. M.

FRIDAY NOVEMBER 15, 1929

Meeting called to order at 10:00 A. M.

Paper: Surface Films of Fats and Fatty Acids. Professor Arthur W. Thomas, Professor of Organic Chemistry, Columbia University.

Paper: Expanding the Market for Soap and Glycerine. R. C. Edlund, Manager, Association of American Soap and Glycerine Producers.

Paper: Cod Liver Oil and the Vitamine Theory. Dr. Arthur D. Holmes, Director of the Research Laboratories, E. L. Patch Co., Boston.

Paper: Systematic Organic Analysis. Professor W. F. Whitmore, Professor of Organic Chemistry, Brooklyn Polytechnic Institute.

Paper: Presentation of Evidence in Oil Litigation. M. F. Lauro.

Paper: The Use of the Ultra-Violet Ray in Detecting the Presence of Refined in Virgin Olive Oils. Sidney Musher, Treasurer, Pompeian Corporation, Baltimore, Md.

After luncheon, a trip through the new Appraisers' Stores Laboratories of the Treasury Department will be available. This laboratory is equipped to handle any material from rare earths and metals, to oils, textiles, dyes, etc.

The Secretary of The American Oil Chemists' Society announces that the Revisions of the Society's Official Methods of Analysis for fats, oils, and soaps are now ready for distribution. Upon receipt of thirty cents, the Secretary will forward a set of the Revisions for insertion with the original loose leaf set of Methods. To those who have not purchased the original Methods, the complete set including the Revisions, will be forwarded for 75c, without binder, or for $1.75, including binder. Postage is extra, in either case. The Secretary's address is: J. C. P. Helm, 705 Tchoupitoulas Street, New Orleans, Louisiana.

The Purit Activated Carbon Division of Durkee Famous Foods, Inc., formerly The Glidden Food Products Co., is now located at the main New York plant of the company, Elmhurst, L. I. A. A. Jackson continues as Manager of the Purit Division.

Margarine Consumption Increasing

Increased Use of Domestic Products Due to Demand for High Quality Foods and the Balanced Diet.

THE increasing consumption of vegetable oils and oleomargarine, by the American public is cited as an important recent change in our dietary habits by Dr. Leo Wolman in the survey of the National Bureau of Economic Research published with the report of the Committee on Recent Economic Changes under the title "Recent Economic Changes."

"One of the most striking changes in the American diet of the past half century, and especially since the war," writes Dr. Wolman, "has been the increasing use of vegetable oils, either in the place of fats or as supplements to them. The change can be observed even in the composition of oleomargarine, a product containing both animal and vegetable fats. Prior to the war, vegetable oils usually furnished less than one third of the total fatty ingredients; with the increasing use of cocoanut oil, which is solid at ordinary temperatures, the proportion of vegetable oils has risen until recently they have constituted over 50 per cent.

"The consumption of margarin has never been as high in the United States as in several countries of Europe where it has been highest in a few small countries which are large producers of dairy products. Since the war, in spite of the recovery in production of animal fats and dairy products, the consumption of margarin has tended upward, largely because of technical improvements making for higher palatability, perhaps also because of truer knowledge of its food value. In the United States, legislation has been restrictive, and there is some popular prejudice against margarin. The consumption rose to unusually high levels during the war and immediately thereafter when butter prices were relatively high. From a peak in 1920, per capita consumption of margarin sharply declined to a level in 1922 less than half the 1920 figure, while butter consumption increased by about the same amount. The increase in per capita consumption of butter represented in part a recovery from a temporary decrease in consumption during 1917, 1918 and 1919. Since 1922 butter and margarin consumption have both tended upward though preliminary figures for 1927 show a decline in butter greater than the increase of oleo. Taking the products together the net increase in terms of calories per capita was only about 12 per cent between 1919 and 1926.

"Another important factor in the displacement of animal fat by vegetable oil is the increased use of vegetable oils as shortenings and cooking fats. This began in the Eighties with the adulteration of lard with cotton seed oil. Later lard substitutes were manufactured from oleostearin and cotton seed oil. About 1910, with the development of the process of hydrogenating oils, solid cooking fats were produced from cotton seed and similar oils alone. They now represent one of the most important types of fats for cooking and shortening purposes. The volume consumed is of the same order of magnitude as the quantity of lard exported. If it were not for the extensive use of vegetable oils, but a small lard export would be possible in some years. Consequently, cottonseed oil has been extensively diverted from industrial to dietary uses.

(*Turn to page* 33)

THE growth in the consumption of margarine has been accelerated by improvements in the methods of refining oils and of compounding margarines, which have resulted in the production of products of superior quality, believed to closely approximate butter in flavor, consistency and nutrient values. Properly prepared margarines are said to contain all the vitamins which are inherent in butter and to be just as satisfactory a product for the promotion of growth and health of children. The consumption of both margarine and butter in the United States is still much lower on a per capita basis, than that in most European countries, which shows that the opportunity for growth of the margarine industry in this country is extensive.

Beginning early in 1930, OIL & FAT INDUSTRIES will publish a Series of Articles fully covering the most advanced technology and methods of Margarine Manufacture.

Oil Chemists' Soap Section Reports

Complete Summary of Results of Cooperative Work on Analysis of Glycerine and Standardization of Reagent Acid

By W. A. PETERSON, *Secretary*

THE committee is glad to be able to announce that the work on the standardization of the A. O. C. S. crude glycerine sample is complete and an accepted analysis can be reported at this time. Results in close agreement have been received from 16 laboratories. These values have been averaged according to a method agreed upon by the committee, with the final accepted averages shown in the following tabulation as "average C." This final average is considered as representing the most accurate results obtainable by the International Acetin Method for crude glycerine on the sample under examination and is to be the accepted analysis for the A. O. C. S. Standard Crude Glycerine sample. The results of the individual laboratories and the derivation of the final average is given in the following tabulation.

Considering the fact that the analysis of a crude glycerine by the International Acetin Method is rather difficult, the agreement shown by 16 different laboratories is exceptionally good. The I. A. M. does not prescribe definitely the method to be used in standardizing the acid. In the opinion of the committee this should be more specifically defined. With this in view, the committee submits two methods; one for the standardization of normal sulphuric acid and an alternate one for hydrochloric acid for consideration by the proper committee of the A. O. C. S., to the end that if it be considered advisable these methods might be inserted in the "A. O. C. S. Standard Methods." The method follows:

A. O. C. S. Standard Sample Crude Glycerine

Lab.	% Total Acetylizable	% Acetin Residue	% True Glycerol	% Total Residue at 160°C	% Ash	% Organic Residue
(1)	83.73	.53	83.20	10.20	8.54	1.66
(2)	83.69	.53	83.34	10.52	8.61	1.91
(3)	83.56	.54	83.02	10.75	8.79	1.96
(4)	83.77	.54	83.23	10.45	8.52	1.93
(5)	83.85	.42	83.43	10.14	8.69	1.45
(6)	83.70	.46	83.24	10.10	8.85	1.23
(7)	83.45	.20	83.25	10.19	8.82	1.37
(8)	83.93	.52	83.41	10.61	9.11	1.50
(9)	83.72	.25	83.47	10.00	9.02	.98
(10)	83.71	.44	83.27	10.61	8.56	2.05
(11)	83.89	.76	83.13	10.00	8.93	1.07
(12)	83.90	.44	83.46	10.27	8.61	1.66
(13)	84.03	.57	83.46	10.32	8.79	1.53
(14)	83.87	.68	83.19	10.27	8.73	1.54
(15)	83.90	.73	83.17	10.78	8.87	1.91
(16)	83.29	.23	83.06	10.37	8.80	1.57
Ave. (a)	83.75	.48	83.27	10.35	8.77	1.58
From Above Averages						
	Excl. Items more than .25 from Ave. (a) Items 7, 13 & 16 out	Excl. Items more than .25 from Ave. (a) Items 7 & 11 out		Excl. Items more than .50 from Ave. (a) No items out	Excl. Items more than .25 from Ave. (a) Item 8 out	
Ave. (b)	83.79	.48	83.31	10.35	8.74	1.61
	Excl. Items more than .20 from Ave. (b) Items 3, 7, 13 & 16 out	Excl. Items more than .15 from Ave. (b) Items 7, 9, 11, 14, 15 & 16 out		Excl. Items more than .25 from Ave. (b) Items 3, 8, 9, 10, 11 & 15 out	Excl. Items more than .15 from Ave. (b) Items 1, 4, 8, 9, 10 & 11 out	
Ave. (c)	83.81	.48	83.33	10.28	8.76	1.52

Standardization of Normal Sulphuric Acid Against Sodium Carbonate

The Na_2CO_3

The Na_2CO_3 may best be prepared by precipitating $NaHCO_3$ from a cold solution of pure Na_2CO_3 by saturating the solution with CO_2 gas. The $NaHCO_3$ filtered, washed two or three times with cold distilled water, and heated in the air (in an oven or other air bath) to constant weight at a temperature not above 270°C. This produces Na_2CO_3 of definite purity. Sodium carbonate, or bicarbonate known to be of a satisfactory quality and specially prepared for standardization use by reputable manufacturers, laboratories, chemical societies or government bureaus, may be employed. The A. O. C. S. has a suitable Na_2CO_3.

The Acid

Use C. P. sulphuric acid 1.835=1.84 sp. gr. For each liter of solution use 30 cc of the C. P. acid making up to 1 liter with distilled water. This approximate solution will have a normality of around 1.03=1.04 and is to be adjusted to exact normality later.

The Burette

The burette must have a Bureau of Standards certificate. A 50 cc burette is preferred.

The Indicator

Methyl orange of indicator quality must be used as the indicator; 1 gram of methyl orange to a liter of distilled water.

The Technic

Put 10-15 g. of the special Na_2CO_3, (or $NaHCO_3$) in a platinum dish or crucible and heat to constant weight at a temperature of 260-270°C but not to exceed 270°C. This usually does not take over an hour. Then cool dish and contents in a desiccator. Weigh accurately 2 to 2.2 g. of the constant weight Na_2CO_3 in an aluminum weighing pan or small porcelain dish and brush into a suitable flask (250-500 cc Erlenmeyer, or a liter florence flask). Add 50 to 150 cc of distilled water, the quantity depending on size of flask used, and dissolve the carbonate without heating. Add 2 drops of methyl orange indicator, 3 drops if 150 cc, and titrate with the H_2SO_4 solution using a burette with B. of S. Certificate.

Calculation:

$$\frac{\text{Wt. of } Na_2CO_3}{\text{cc titration x .053}} = \text{Normality:}$$

The normality should be over one for easy adjustment—suppose it comes 1.0400 normality. Dilution to approach exact normality: To calculate the amount of water to add to approach normality, multiply the volume by the normality and subtract the volume, thus: Suppose about 10 liters of solution are to be made up and the exact volume to be diluted is 9900 cc with 1.0400 normality; (9900 x 1.0400) —9900=396 cc of H_2O indicated to give a normality of 1. Add, however, only about 90%, say, of the 396 cc. Less than the exact amount is added to prevent obtaining a solution below normal, which is harder to adjust. Once again determine the normality of the diluted solution and again dilute as before. For the third time obtain the normality of the solution and dilute with the amount of water indicated to make exactly normal. The solution should now be very close to precisely normal. Consider the solution standardized when duplicate titrations agree within 0.001 in normality, using the average as the normality of the acid solution. If this last normality is not precisely 1, the solution may, if desired, be finally adjusted to the exact normality of 1 if it is not desired to use a factor.

In connection with the titration: At the first appearance of red, place a small funnel in the mouth of the flask and boil for 10 minutes to remove the dissolved CO_2. The solution is then cooled and the titration carried to the first color change.

If the temperature at which the titration is made is other than the standard temperature of 20°C, a temperature correction must be made. The temperature correction table is given below. The corrections are for each 100 cc used.

Corrections for Temperature per 100 cc

°C	cc	°C	cc
15	+0.13	23	—0.09
16	+0.11	24	—0.12
17	+0.08	25	—0.15
18	+0.06	26	—0.18
19	+0.03	27	—0.21
20	0.00	28	—0.25
21	—0.03	29	—0.28
22	—0.06	30	—0.31

(NOTE: Foulk and Osborne, Department of Chemistry, Ohio State University, have studied the preparation and use of sodium bicarbonate as an ultimate standard. They have found that heating it in air above 270°C causes some decomposition. If heating and subsequent cooling is conducted in an atmosphere of carbon dioxide, the temperature may be above 270°C. This investigation is to be published in the near future.)

Private communication to Dr. W. W. Mills, Mellon Institute Analyst.

Preparing Acid Solution

THE method of preparing a master solution of hydrochloric acid is to weigh out a definite amount of constant boiling solution of hydrochloric acid and dilute this to a certain volume. The following table gives the composition of a constant boiling solution prepared at various barometric pressures:

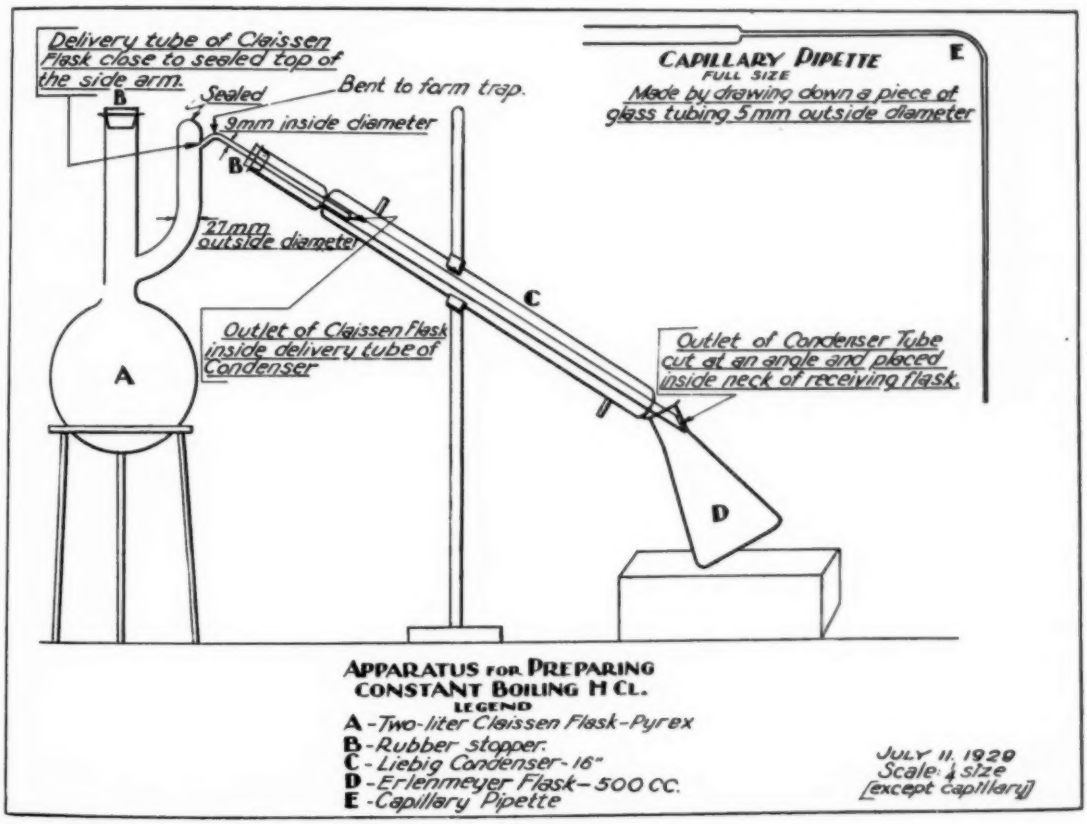
Barometric Pressure	Per Cent HCl	Grams Constant Boiling Distillate Containing 1 mol. HCl
770	20.218	180.390
760	20.242	180.170
750	20.266	179.960
740	20.290	179.745
730	20.314	179.530

Since the composition of the distillate is a straight line function of the pressure within the usual range, extrapolation may be employed for pressures between the points given. *(Hulett and Bonner, J. Amer. Chem Soc., 31,309)*

The following apparatus has been found desirable for the preparation of the constant boiling acid. (Description of apparatus and technique furnished by Dr. E. P. Clark, of the Bureau of Chemistry and Soils of the U. S. Dept. of Agriculture, in a private communication dated May 29, 1929). The accompanying sketch illustrates the set-up.

The distillation flask (A) is a two liter pyrex Claissen flask with the side tube sealed at the top. A small piece of crumpled platinum foil is placed in the flask to cause steady boiling. 750 cc of reagent quality concentrated hydrochloric acid are diluted with 750 cc of distilled water. This is placed in the flask and the solution is distilled at a slow rate, using a Leibig condenser (C); when ¾ has been distilled off, change the receiver (D)—a 500 cc Erlenmeyer flask—and collect as much of the remainder as is desirable. The last fraction is the constant boiling solution and, if the barometric pressure is noted, the exact weight of HCl in this distillate may be calculated from the table given above. By weighing out the requisite amount of the constant boiling acid and diluting with distilled water to one liter, or any other volume, a solution of the desired normality may be prepared. In weighing the liquid it is desirable to tare the flask, add approximately the desired quantity, and finally get the exact weight by adding or subtracting the necessary amount by means of a capillary pipette (E) bent at right angles as shown in the sketch. The pipette may be made from a small piece of glass tubing about 5 mm outside diameter. Experience has shown that if attention is given the following points in connection with the set-up of the apparatus, excellent results will be obtained.

(1) Use a two-liter pyrex Claissen distillation flask with the side-arm sealed to avoid the use of a rubber stopper.


Delivery tube of Claissen Flask close to sealed top of the side arm.
Sealed
Bent to form trap.
9mm inside diameter
B
B
21mm outside diameter
C
Outlet of Claissen Flask inside delivery tube of Condenser
A
Outlet of Condenser Tube cut at an angle and placed inside neck of receiving flask.
D
CAPILLARY PIPETTE
FULL SIZE
E
Made by drawing down a piece of glass tubing 5mm outside diameter
APPARATUS FOR PREPARING CONSTANT BOILING H Cl.
LEGEND
A - Two-liter Claissen Flask - Pyrex
B - Rubber stopper.
C - Liebig Condenser - 16"
D - Erlenmeyer Flask - 500 CC.
E - Capillary Pipette
JULY 11, 1929
Scale: ¼ size
(except capillary)

(2) Have the delivery tube of the Claissen flask close to sealed top of the side-arm. Bend the delivery tube to form a trap, thereby preventing any droplets from being carried over mechanically.

(3) Use a 16-inch Liebig condenser and have the outlet of the delivery tube of the Claissen flask long enough to go inside the delivery tube of the condenser. This arrangement keeps the acid out of contact with the rubber stopper.

(4) Cut the outlet tube of the condenser at an angle and adjust the mouth of the receiving flask. This is done as an extra precaution against possible evaporation or contamination.

(5) Use equal volumes of reagent quality concentrated hydrochloric acid and distilled water, discarding the first three-quarters of the distillate and collecting as much of the last quarter portion as may be desired.

(6) The exact weighing of the distillate is greatly facilitated by employing the special capillary pipette recommended.

The committee suggests that HCl prepared by the above method be checked against sodium carbonate so that no matter which acid is used, there will be a uniform standardization method. It is understood that B. of S. weights are to be used in these standardizations. There will be available about one hundred bottles of the A. O. C. S. Standard Crude Glycerine Sample which the committee will turn over to the A. O. C. S. for sale at a nominal price.

The work on the soap sample is making good progress and the committee hopes that an accepted analysis can be reported at the next meeting. The personnel of the Soap Section Committee and the co-operating laboratories working on the soap and glycerine samples follows. It should be noted that all the laboratories did not work on the glycerine sample.

Ralph W. Bailey, Stillwell & Gladding, Inc., New York City.

A. K. Church, Chief Chemist, Lever Bros. Co., Cambridge.

Chas. J. Gundel, Works Chemist, Fels & Co., Philadelphia.

L. F. Hoyt, Manager, Research Dept., Larkin Co., Inc., Buffalo.

Martin H. Ittner, Chief Chemist, Colgate-P. O. -Peet Co., Jersey City

H. J. Morrison, the Procter & Gamble Co., Ivorydale.

Wm. A. Peterson, Chief Chemist, Kirkman & Son, Brooklyn.

W. D. Richardson, Chief Chemist, Swift & Co., Chicago.

M. L. Sheely, Chief Chemist, Armour Soap Works, Chicago.

H. P. Trevithick, Chief Chemist, N. Y. Prod. Exchange, New York City.

R. B. Trusler, Industrial Fellow, Mellon Institute, Pittsburgh.

H. C. Bennett, Chief Chemist, Los Angeles Soap Co., Los Angeles.

V. K. Cassady, Chief Chemist, The Palmolive Co., Milwaukee.

Curtis & Tompkins, San Francisco.

R. C. Dickson, Chief Chemist, Colgate-P. O. -Peet Co., Berkeley.

M. M. Durkee, The A. E. Staley Mfg. Co., Decatur.

F. E. Joyce, Haskins Bros. & Co., Omaha.

A. J. Harvey, Technical Director, Lever Bros., Ltd., Toronto.

John Ornfelt, LaFrance Mfg. Co., Philadelphia.

Foster D. Snell, Brooklyn.

W. J. Reese, Chief Chemist, Colgate-P. O.-Peet Co., Kansas City.

The chairman and secretary wish to express to each member of the committee and each cooperating laboratory their appreciation of the splendid way in which this first piece of work undertaken by the Soap Section was carried out.

Olive Oil Situation in Spain

THE American Consul at Barcelona reports there has been no cause, during the third quarter of 1929, to change the earlier optimistic estimates of the season's olive and olive oil crop. The trees were benefited by recent rains and the fruit is said to be in good condition. There are still large stocks of olive oil on hand remaining from previous harvests, due to the unprecedented output of 1927. The result is a confused condition of the market, characterized by falling prices.

According to American Trade Commissioner Ehrhardt, shipments of soya beans from Mukden, Manchuria to the south were amounting to between twenty-five and thirty thousand tons daily during November. The shipments taxed the facilities of both the Chinese Eastern and South Manchurian railways.

"Virgin" Olive Oil and the Ultra-Violet Ray

Presented before the Fall Meeting of the American Oil Chemists' Society in New York, November 15, 1929

By Sidney Musher

FOR years, olive oil has played a definite role as a food, as well as having wide use in nutrition and for medicinal purposes. The necessity for placing definite standards and for fixing distinct tests to determine the presence of refined olive oil in "Virgin" olive oil has become necessary only with the advanced knowledge on the values of "Virgin" olive oil in comparison to the corresponding qualities of a refined olive oil. More particularly, the reliance placed upon "Virgin" olive oil in therapeutics and in medicine has hastened the need for this test. Taste cannot be relied upon as a method for distinguishing between these two oils. From the standpoint of flavor, 10% of a highly-flavored "Virgin" olive oil with 90% of refined olive oil may appear identical with a 100% average "Virgin" olive oil. The unrefined unsaponifiable matter, the enzymes, and other lipoidic constituents place "Virgin" olive oil upon a plane apart from all other oils and make it necessary—for information of the public as well as of the physicians who are daily prescribing olive oil—to define more clearly the term "Virgin" olive oil and to adopt a test for assuring the purchaser of its purity.

I have suggested to the Olive Oil Committee that the following definition for "Virgin" olive oil be adopted:

"Virgin Olive Oil (edible) is the first, cold-pressing of sound, properly matured fruit of the cultivated olive; clarified only by mechanical means; neither wholly nor in part chemically refined nor otherwise subjected to chemical or heat treatment, not bleached nor deodorized."

This standard is very similar to that of the United States Government Standard Specification No. 77 of the Federal Specifications Board which was originally prepared by Dr. Jamieson of the Bureau of Chemistry. It is interesting to note that in the Standard Specification No. 77, the olive oil referred to is "Olive Oil (edible grade)"; and although mention is not made of the word "Virgin," yet the specification as adopted relates particularly to "Virgin" olive oil.

For several years, we have been carrying on research in collaboration with outside laboratories, as well as in our own laboratory, for the purpose of determining whether the objections which have been raised to the ultraviolet-ray test are justifiable or whether they are as a result of errors in obtaining authentic samples of olive oil or in the general procedure. Not less than twenty articles have been published within the past five years regarding the adaptability of the ultraviolet lamp as a means for distinguishing differences between "Virgin" and refined olive oils, and mixtures of the two. A number of articles have also been published on differentiating other "Virgin" oils from refined oils, butter from margarine, etc. In our research, however, we have paid particular attention to the use by means of which the ultraviolet lamp may be applied to "Virgin" olive oil. Inasmuch as we have found this test is unquestionably satisfactory in *all* cases, our next step was to determine the cause for the objections which had been raised in the past. We went very thoroughly into the method of pressing California olive oil, in view of the fact that the only sample which the Bureau of Standards originally received in 1927 (when its attention was called to this test) was of a California, supposedly "Virgin" olive oil, which, when placed under the ultraviolet lamp, showed an orange fluorescence, which slightly resembled that of refined olive oil.

We now know that the general method in use in California today for the expression of olive oil is one in which four pressings of the olive are made, which four pressings are allowed to run into one trough, there to be mixed and used as "Virgin" olive oil. In view, however, of the fact, that, primarily, such a mixture does not constitute first pressing, also, that in the third and fourth pressings the olives are subjected to heat and steam treatment—in order to obtain a higher yield of the oil; although this olive oil may be termed "crude," it cannot properly be called a "Virgin" olive oil. The oil, then, which was

(*Turn to page* 33)

A Method of Testing Pure Lard[1]

Differentiating Lard and Lard Compounds, Particularly Those Containing Hydrogenated Vegetable Oils

By H. P. Trevithick and M. F. Lauro

THE commonly accepted method of determining the presence of mixtures of vegetable oils in animal fats is by determining the presence of phytosterol in the unsaponifiable matter. This is done by crystallizing the sterols from the unsaponifiable matter, examining them microscopically, preparing the acetates of the sterols, purifying them by recrystallization from alcohol, and determining the melting points. The procedures outlined in the Methods of the Association of Official Agricultural Chemists are satisfactory. The preparation of the unsaponifiable matter by either the alcohol extraction method or the digitonin method is satisfactory, but the microscopical examination does not give very dependable results, particularly when there are mixtures of cholesterol and phytosterol present.

On acetylization, however, pretty definite results are generally given by determining the melting points of the various crops of crystals of sterol acetates. After the second or third recrystallization, the melting points should approach definitely the melting points of the pure acetate, if only one of the sterols is present, but if the phytosterol acetate is present in the cholesterol acetate, the melting points should show a gradual increase in value with each successive recrystallization.

Further indications are given by concentrating the mother liquors of each crop of crystals, and then obtaining further deposits from these liquors. Theoretically, if only one kind of sterol is present, such as cholesterol, the crystals from the mother liquor should melt at the same point as the preceding crop from the same liquor. In practice these may be contaminated with impurities from the mother liquor and need recrystallization. After such purification, valuable indications may be obtained by the above procedure, as the acetates of the sterols do not have the same solubilities in alcohol, and the least soluble crystallizes first. If only one acetate is present, the second crop from the mother liquor will be of the same kind of acetate as the first.

Table No. 1 gives the results of some tests made on samples which were all vegetable, and were of known origin.

TABLE No. 1

Melting Points of the acetates from:

	1st crys.	2nd crys.	2nd crop 1st mother liquor	2nd crop 2nd mother liquor	2nd crop from 80% alc.
Sample No. 1	120	126.5	—	—	121.0
" " 2	125	125.4	*122.	—	119.0
" " 3	121.4	125.6	*119.2	—	—
" " 4	123.2	124.8	—	122.6	—
" " 5	127.4	128.9	—	127.	—

*Not Purified

On a sample containing 20% tallow and 80% cottonseed oil, these results were obtained:

TABLE No. 2

Melting Points of the acetates from:

1st crys.	2nd crys.	1st mother liquor
120	122.6	114.8
121.5	124.0	—

A sample of lard gave the following results:

TABLE No. 3

Melting Points of the acetates from:

		2nd crys.	
1st crys.	2nd crys.	2nd mother liquor	3rd crop
111.0	113.8	108.0	113.8

On this sample there is no evidence of the presence of any vegetable oil.

[1] Presented at the Third Fall Meeting of The American Oil Chemists' Society.

Quicker Methods Desirable

THESE tests show the results that may be obtained by the use of the sterol acetate test, but the method is long and tedious, as large quantities of oil must be saponified and extracted to get enough of the unsaponified matter for further tests. Then this unsaponifiable matter must be resaponified and re-extracted to insure the removal of all saponifiable oil.

For the above reasons, the use of other means of determining this question of admixture of vegetable oils in lard, particularly of determining the presence of hydrogenated vegetable oils in pure hog lard, seemed very desirable, at least for confirmatory evidence.

A sample of lard, whose purity was questioned, showed the following analysis:

Free Fatty Acids (Oleic)	1.29%
Iodine Value (Wijs)	63.3
Titre	39.8° C
Iodine Value (Wijs) of total fatty acids	64.7
Melting Point (capillary tube method)	43.3° C
Unsaponifiable Matter (FAC)	0.62%
Halphen Test (cottonseed oil)	Negative
Villavechia Test (sesame oil)	Negative

The following results were obtained by another laboratory on another sample of the same parcel of lard:

Melting Point	46.5° C
Iodine Value (Hanus)	60.7
Saponification Value	191.4
Unsaponifiable Matter	0.39%
Solid Fatty Acids	30.7%
Iodine Value (Hanus) of the liquid fatty acids	89.2
Iodine Value (Hanus) of the total fatty acids	62.1
Melting Point of the total fatty acids	41.6° C

Although no evidence of the presence of any fat, except lard, was indicated by the above analyses, further evidence was necessary to prove its purity.

In 1913-14, Bomer published the results of a splendid piece of research on the constituents of hog lard, tallow and other fats, and showed that among the constituents of lard was alpha-palmitodistearin, which has a melting point of 68.5°C, and whose fatty acids show a melting point of 63.3°c. He also showed that a glyceride of the same empirical formula was found in tallow, but that it was betapalmitodistearin, with a melting point of 63.3°C, and that the acids from the glyceride melted at 63.2°C.

Based upon this research, in which he examined fats from all parts of the animals, including hogs, cattle, etc., and all kinds of mixtures of these different kinds of fats, Bomer devised a method which is called the Bomer Test, in which the solid glycerides of the fat are crystallized from ether solution, endeavoring to eliminate all glycerides of lower melting point than the palmitodistearins. The glycerides are subsequently saponified, and the fatty acids separated from them. After determining the melting points of the glycerides and the fatty acids from them, a value is obtained for the Bomer number, which is obtained by subtracting the melting point of the fatty acids from that of the glycerides; doubling that difference, and adding it to the melting point of the glycerides. If this value is less than 71, the hog fat is considered adulterated with tallow. This is due to the fact that the betapalmitodistearin of beef fat melts at 63.3, the same as the melting point of the fatty acids from it, and, therefore, there would be none or only a very small difference between the melting points of the glycerides and the fatty acids. Lards containing considerable quantities of beef or mutton fat give Bomer numbers from 66 to 68, although there are mixtures which closely approach the minimum of 71. Bomer also tested the effects of various vegetable oils on this test, and found that they do not interfere with its efficacy. He does not give any data on the question of detecting the presence of hydrogenated fats, although he does mention that they would act like tallows.

Results on Compounds

QUITE independently, we applied this method to the above sample of lard, and also six samples of American lard compounds, three of which were made wholly from cottonseed oil, and the other three of which were well known standard brands of commercial vegetable oil products, with results as follows:

TABLE No. 4

Samples	A	B	C	D	E	F	LARD
Melting Point Glycerides	58.5	65.3	64.4	63.8	58.7	60.3	64.9
Melting Point of Fatty Acids	70	64.5	64.3	63.5	55.4	56.9	60.2
Bomer Number	—	67.2	64.6	64.4	65.3	67.1	74.3

As will be seen, the lard easily passed the requirements of the Bomer test for pure hog fat, but all the hydrogenated vegetable oil compounds failed. Of these lard compounds, C and D were mixtures of hydrogenated and unhydrogenated oils, and E and F were all

hydrogenated products. The composition of A and B were not definitely known, but apparently were also all hydrogenated. These samples gave the following results when tested further:

TABLE No. 5

	A	B	C	D	E	F
Free Fatty Acids	0.07%	0.07%	0.06%	0.06%	0.18%	0.12%
Iodine Value	48.4	69.1	98.6	98.4	71.1	67.2
Iodine Value of the Crys. Glycerides	42.3	—	5.2	6.7	9.9	12.8
Melting Point (approx.)	—	—	43.5	45.0	—	—
Solid Acids	—	—	35.0	34.0	—	—
Iso-oleic Acids	—	—	2.5	3.0	14.38	8.53
Halphen Test	Trace	Neg.	Pos.	Pos.	Neg.	Neg.

Thus by the use of this test, it was proved conclusively that the sample of lard was pure lard, not containing any fats of vegetable origin, and this result could be obtained in a much shorter time, and with as much, if not more certainty, than could be given by the phytosterol acetate test.

Also this test demonstrates that the hydrogenated fats act as tallows under its conditions.

The method for this test is as follows:

"Dissolve 50 grams of the clear dry filtered fat in 50 cc of ether, cool to 15°C for one hour with occasional agitation. Filter off the crystals on a Buchner funnel with suction, pressing the crystals dry. Redissolve in 50 cc of ether again, and recrystallize as before. If these second crystals do not melt above 61°C, the crystallization is repeated a third time.

A portion of these crystals is saponified with caustic potash and alcohol, dissolved in 100 cc of water, acidified with dilute hydrochloric acid, and extracted in a separatory funnel with 50 cc of ether. This ether extract is washed twice with 10 cc of water, filtered into a dry beaker, evaporated to dryness, and heated in an oven at 105°C for 30 minutes.

The melting points of the glycerides and fatty acids are now determined in capillary tubes, placing one of each on each side of the thermometer, and heating in a water bath. Subtract the melting point of the fatty acids from that of the glycerides, double this difference and add it to the melting point of the glycerides. This Bomer number should not be less than 71, but may run as high as 78 for leaf lard.

The following precautions must be observed: The glyceride crystals must not be melted prior to the determination of the melting point.

The fatty acids can be melted into the capillary tubes, however, but must be kept in a desiccator until the melting point is determined, as they will pick up ammonia very rapidly, forming soaps, and increasing in melting point considerably.

If the fat is rather liquid, the quantity of fat can be increased on the first crystallization, the time can be extended to two hours, the temperature can be lowered to 5°C, anhydrous acetone may be used, or a mixture of 3-4 parts of ether and 1 part of alcohol can be used, in order to get a sufficiently large first crop of crystals. Subsequent recrystallizations must be from ether."

Bibliography

Z. Nahr. Genussm	23-641/53
	25-321/53
	25-354/66
	25-367/86
	26-559/618
	27-153/73
Seifensieder Ztg.	40-147
Chemical Abstracts	6-2916
	7-1427
	7-2128
	8-1174

The Baltimore office of the Spencer Kellogg & Sons Sales Corporation, which is in charge of Alfred Day, has been moved to a new location on the eighth floor of the American building, where more space is available.

The Greek tobacco control office is endeavoring to promote the manufacture of the expressed oil from tobacco seed. The oil is said to be edible as well as useful as a soapstock, and the oil meal can be used as a cattle feed.

Correction

ON page 27 of *Oil & Fat Industries for* November, in the article entitled "Proposed Thiosulphate Number for Olive Oil" by Wallace H. Dickhart, the fourth column in the table of *"Experimental Data"* should be headed "Index of Refraction at 40° C." instead of "Valenta Index" as originally printed. The footnote exponent [1] in the first column of the same table should have appeared one line lower, i.e., against the figures 5.28, instead of against 4.78, as printed.—*Ed.*

Recommends Extension of Mayonnaise Research

Association's Standards and Research Committee Plans to Establish Research Fellowship in Washington

By DAN GRAY, *Chairman*

The Standards and Research Committee of the Mayonnaise Products Manufacturers' Association of America, Inc., in submitting their annual report for 1929, at the recent convention of the Association at Atlantic City, reviewed the progress of the Association's research and standardization work and proposed the establishment of a Research Fellowship at the Department of Agriculture in Washington for the further prosecution of investigations into the quality and components of mayonnaise products. Dan Gray, of Wheeling, West Virginia, is Chairman of the Research and Standards Committee. The report in full as submitted follows:

Dan Gray

DUE to the complex activities in which the Committee has become engaged, and the large number of undertakings which have been entered upon in the last year, it has become necessary to divide the Committee into a series of sub-committees. For each sub-committee there was appointed a Chairman to actively further the particular line of work of his own sub-committee. It was found that such a system improved the general operating efficiency of the Committee to a considerable extent. It has been the practice of the Committee, in the past, to offer assistance and cooperation to manufacturers of commodities and equipment of possible use to the mayonnaise industry in any research or program of investigation which they had undertaken. This phase of Committee work is being continued and enlarged. As examples of this class of cooperative work we may cite the cooperation between the Committee and such concerns as the California Fruit Growers Exchange, who are doing considerable research on the possibilities of using pectin in mayonnaise.

The second type of work we may class as intra-committee cooperative work — these investigations involving the cooperative efforts of the members of the Standards and Research Committee only. As an example of this type of work we may mention sub-committee #8, which recently undertook a series of investigations to determine the effect of using different kinds of oil with a view to preventing or reducing the separation which takes place when mayonnaise is exposed to freezing temperature and thawed out. At the same time, the mayonnaise made from each of these oils was studied with a view to determining its tendency to become rancid. The findings of this sub-committee were reported to the Standards and Research Committee and are now in progress of compilation. When completed a comprehensive report covering this work will be turned over to the members of the Association. As another illustration of cooperative work between the Research Committee and outside organizations may be cited the work of sub-committee #10, which is undertaking a study to find out which metals are best suited for use in the mayonnaise industry, with respect to their resistance to corrosion. The cooperation of the International Nickel Company and the Central Alloy Steel Company has been secured in this work. A fairly comprehensive program for investigation has been outlined and approved by the Standards and Research Committee and work will begin in the near future.

At a past meeting of the Standards and Research Committee it was decided that a comprehensive and continuous bibliography on mayonnaise should be maintained. Accordingly, sub-committee #9 undertook this work and compiled an extensive list of book references, trade journal articles, scientific and technical journal references, pertaining not only to mayonnaise and associated products, but also to the products entering into the manufacture of mayonnaise, such as oil, vinegar, salt, spices, etc. This sub-committee has recently submitted an additional list of 85 references to be added to the present bibliography. These references are published to the

members of the Association in the form of bulletins by the Executive Secretary. Another sub-committee has compiled a technical pamphlet, to which reference has already been made by the Chairman of the Publicity Committee, covering the history, composition, nutritive value, etc. of mayonnaise. This pamphlet is written in semi-technical language and is readily understandable by the average domestic science teacher, club leader, dietitian, and physician. As Mr. Collins, Chairman of the Publicity Committee, has already pointed out, this class of people seems very eager for authentic information of this character concerning mayonnaise. In preparing this pamphlet, the services of authorities on each of the different raw materials used in commercial mayonnaise were secured and write-ups covering each of these materials submitted. These write-ups were then edited and compiled by the sub-committee, resulting in a technical pamphlet of unified style and composition and of unquestionable authority.

It has been evident to the members of the Committee for some time that standard methods of analysis and testing of mayonnaise and the raw materials entering into its manufacture is highly desirable. Accordingly, sub-committee #7 has been appointed to work out and compile such methods. While this work is primarily for the guidance and assistance of the Committee, in order that the work of one member may be comparable with another, it should also be of considerable value to the chemists and plant operatives of the Association. Due to the difficulty and complexity of this undertaking the sub-committee has not yet finished this work, having been occupied with this undertaking for almost a year. In addition to the development of new methods, it is also important that all members of the Standards and Research Committee try out all the methods submitted and establish their suitability. When this work is complete, the results will be available to the members of the Association.

The Standards and Research Committee is of the opinion that the time has arrived when a more active policy with regard to research should be pursued. The Committee will continue to function as it has in the past, but feels that there should be a definite arrangement made whereby problems facing the industry could be comprehensively and impartially studied. The problems for proposed study would be of extreme practical importance to the industry and would not be theoretical or academic in character. For example, a properly planned and carefully conducted investigation should be made to determine, and if possible eliminate, the factors involved in the deterioration to which practically all mayonnaise is susceptible. Removal or correction of these undesirable factors would increase the life of mayonnaise as regards its ability to reach the ultimate consumer absolutely unchanged, tending to reduce the percentage of returned goods and thereby being translatable into a dollars and cents saving to the mayonnaise industry. Such work is best carried out through a research fellowship. This practice is not at all uncommon in trade association experience. As examples of Associations maintaining such fellowships and carrying out such research work in an active manner we may cite the National Canners Association, Glass Container Association, The Institute of Meat Packers, American Baking Association, Biscuit and Cracker Mfrs. Association, The California Citrus Growers Association, and many others. The proper placing of such a fellowship is a matter of extreme importance, and the Committee has gone over this matter at considerable length, and sincerely believes that it has in mind the best location for such fellowship that is available. The Committee has reference to the Food Research Division, Bureau of Chemistry and Soils, U. S. Department Agriculture, Washington, D. C. subject, of course, to their approval and agreement. There are a number of Associations which maintain men in this Bureau. The advantages are almost too numerous to mention, but may be said to include the valuable contact secured by working with investigators in allied fields, the facilities offered by the Division, the reference facilities of the Division, the authenticity and prestige of findings, and lastly the reasonable cost of maintaining such a Fellowship as compared with that in other institutes not of a government character.

The man holding this fellowship would be selected by the Association, and his work would be carried on under the active advice and cooperation of the Standards and Research Committee. The Committee would also issue current reports of progress and transmit to the members of the Association, on a strictly impartial basis, such findings as would be of value to the industry. It is hardly necessary to say that results of great benefit to the industry would thus be secured by individual members at a fraction of what the cost would be were such work attempted independently by individual members. The Committee strongly urges this proposal and earnestly solicits your active support as it firmly believes that such a step is vital to the progress and prosperity of the mayonnaise industry.

Fat and Oil Data for Third Quarter 1929

Production, Consumption, Exports and Imports with Factory and Warehouse Stocks September 30, 1929

WASHINGTON, D. C., October 31, 1929.—The Department of Commerce announces that the factory production of fats and oils (exclusive of refined oil and derivatives) during the three-month period ended September 30, 1929, was as follows: Vegetable oils, 534,913,482 pounds; fish oils, 45,864,815 pounds; animal fats, 517,313,247 pounds; and greases, 95,037,287 pounds; a total of 1,193,128,831 pounds. Of the several kinds of fats and oils covered by this inquiry, the greatest production, 412,922,498 pounds appears for lard. Next in order is cottonseed oil with 203,399,311 pounds; linseed oil with 188,769,427 pounds; tallow with 112,823,673 pounds; coconut oil with 85,012,073 pounds; and corn oil with 35,521,265 pounds.

The production of refined oils during the period was as follows: Cottonseed, 134,913,891 pounds, coconut, 86,791,504 pounds; peanut, 1,788,350 pounds; corn, 29,062,346 pounds; soya-bean, 1,486,608 pounds; and palm-kernel, 2,604,829 pounds. The quantity of crude oil used in the production of each of these refined oils is included in the figures of crude consumed.

The data for the factory production, factory consumption, imports, exports and factory and warehouse stocks of fats and oils and for the raw materials used in the production of vegetable oils for the three-month period appear in the following statements:

(In some cases, where products were made by a continuous process, the intermediate products were not reported.)

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS

KIND	Factory operations for the quarter ended Sept. 30, 1929		Factory and Ware'se stocks
	Production (pounds)	Consumption (pounds)	Sept. 30, 1929 (pounds)
VEGETABLE OILS: [1]			
Cottonseed, crude	203,399,311	147,449,781	77,348,615
Cottonseed, refined	134,913,891	311,613,227	175,022,786
Peanut, virgin and crude	2,309,146	2,521,384	2,204,312
Peanut, refined	1,788,350	1,555,737	1,495,868
Coconut, or copra, crude	85,012,078	172,456,506	170,795,310
Coconut, or copra, refined	86,791,504	75,678,402	21,150,489
Corn, crude	35,521,265	36,898,410	12,944,667
Corn, refined	29,062,346	4,637,390	11,047,536
Soya-bean, crude	1,455,657	4,537,663	9,041,150
Soya-bean, refined	1,486,608	1,484,038	2,454,397
Olive, edible	—	645,327	6,848,889
Olive, inedible	—	1,552,297	1,763,397
Sulphur oil, or olive foots	—	9,341,073	8,987,757
Palm-kernel, crude	—	17,797,004	19,949,280
Palm-kernel, refined	2,604,829	2,571,816	2,593,349
Rapeseed	—	3,555,743	5,321,921
Linseed	188,769,427	137,543,162	102,911,879
Chinese wood or tung	—	25,060,628	29,438,359
Chinese vegetable tallow	—	4,212,655	3,304,071
Castor	14,896,690	6,941,481	11,435,203
Palm	—	53,342,693	57,979,902
All other	3,549,908	3,810,490	11,183,976
FISH OILS: [1]			
Cod and cod-liver	319,523	3,860,076	7,708,962
Menhaden	12,570,650	8,350,111	9,481,600
Whale	3,942,000	16,301,833	45,383,039
Herring, including sardine	27,529,665	17,804,277	37,503,307
Sperm	93,750	287,684	2,965,220
All other, (including marine animal)	1,409,227	2,339,762	2,621,818
ANIMAL FATS:			
Lard, neutral	7,125,534	7,848,804	5,422,240
Lard, other edible	395,795,964	4,932,959	113,119,869
Tallow, edible	10,175,638	7,543,506	2,606,179
Tallow, inedible	102,648,040	125,785,670	83,831,866
Neat's-foot oil	1,567,071	1,801,266	1,765,051

[1] The data of oils produced, consumed, and on hand by fish oil producers and fish canners were collected by the Bureau of Fisheries.

PRODUCTION, CONSUMPTION, AND STOCKS OF FATS AND OILS (Continued)

KIND	Factory operations for the quarter ended Sept. 30, 1929 Production (pounds)	Consumption (pounds)	Factory and Ware'se stocks Sept. 30, 1929 (pounds)
GREASES:			
White	15,993,295	11,388,699	9,733,857
Yellow	18,254,786	15,934,041	9,468,210
Brown	13,099,105	10,686,009	9,071,624
Bone	6,307,429	576,220	1,785,915
Tankage	12,603,213	103,444	3,283,253
Garbage or house	22,831,619	17,643,659	14,087,323
Wool	2,817,364	1,603,575	4,478,322
Recovered	616,710	810,764	730,957
All other	2,513,766	927,115	2,630,639
OTHER PRODUCTS:			
Lard compounds and other lard substitutes	325,425,234	174,461	30,837,296
Hydrogenated oils	167,188,200	152,266,470	11,871,090
Stearin, vegetable	2,994,124	6,572,055	1,996,216
Stearin, animal, edible	13,765,229	13,895,272	3,257,267
Stearin, animal, inedible	8,060,136	8,182,903	5,363,138
Oleo oil	29,198,991	15,037,490	11,627,754
Lard oil	7,714,306	4,275,661	4,530,366
Tallow oil	2,578,164	2,568,390	1,575,778
Fatty acids	33,408,197	36,578,447	5,601,971
Fatty acids, distilled	8,215,451	5,444,535	1,937,852
Red oil	14,928,605	7,335,168	6,676,095
Stearic acid	9,327,896	2,488,401	4,326,244
Glycerin, crude 80% basis	34,563,045	35,090,038	21,619,524
Glycerin, dynamite	12,897,272	11,339,500	9,606,982
Glycerin, chemically pure	15,723,130	2,133,135	7,502,205
Cottonseed foots, 50% basis	22,513,309	30,412,358	20,804,628
Cottonseed foots, distilled	23,991,550	24,053,137	5,991,787
Other vegetable oil foots	18,540,970	13,639,051	3,053,943
Other vegetable oil foots, distilled	1,006,010	1,588,574	914,333
Acidulated soap stock	10,246,157	12,583,783	10,869,776
Miscellaneous soap stock	912,509	989,398	585,464

RAW MATERIALS USED IN THE MANUFACTURE OF VEGETABLE OILS

KIND	Tons of 2000 pounds Consumed July 1 to Sept. 30	On hand Sept. 30	KIND	Tons of 2000 pounds Consumed July 1 to Sept. 30	On hand Sept. 30
Cottonseed	662,153	590,747	Flaxseed	284,638	89,220
Peanuts, hulled	3,300	939	Castor beans	16,031	7,033
Peanuts, in the hull	146	256	Mustard seed	212	1,575
Copra	65,859	41,004	Soya-beans	5,280	2,102
Coconuts and skins	526	—	Other kinds	3,831	2,243
Corn germs	59,710	323			

IMPORTS OF OIL SEEDS, QUARTER ENDED SEPT. 30, 1929

KIND	Tons	KIND	Tons
Castor beans	17,552	Poppy seed	518
Copra	65,322	Perilla and sesame seed	1,501
Flaxseed	88,363	Other oil seeds	2,962

IMPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED SEPT. 30, 1929

KIND	Pounds	KIND	Pounds
Animal oils & fats, edible	353,983	Palm-kernel oil	10,432,202
Whale oil	1,861,590	Sesame oil	2,652,276
Cod oil	3,402,053	Vegetable tallow	1,174,143
Cod-liver oil	4,547,970	Vegetable wax	925,530
Other fish oils	9,961,185	Carnauba wax	1,970,221
Tallow	301,637	Peanut oil	547,082
Wool grease	2,302,594	Rape (colza) oil	3,373,170
Grease and oils, n.e.s. (value)	$288,285	Linseed oil	39,545
Olive oil, edible	23,964,920	Soya-bean oil	4,103,141
Tung oils	40,484,347	Perilla oil	1,214,200
Coconut oil	97,243,766	Other expressed oils	3,807,129
Sulphur oil or olive foots	6,755,654	Glycerin, crude	3,963,146
Other olive oil, inedible	2,342,616	Glycerin, refined	628,670
Palm oil	75,785,440		

Census Report (*Continued*)

EXPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED SEPT. 30, 1929

KIND	Pounds	KIND	Pounds
Fish oils	67,508	Palm & palm-kernel oil	627,222
Other animal oils & fats, inedible	11,690	Peanut oil	17,771
Olive oil, edible	108,933	Soya-bean oil	62,709
Tung oils	1,545,209	Other expressed oils & fats	93,329
Coconut oil	104,897	Vegetable wax	258,681

EXPORTS OF DOMESTIC FATS AND OILS, QUARTER ENDED SEPT. 30, 1929

KIND	Pounds	KIND	Pounds
Oleo oil	19,851,818	Other animal greases & fats	18,305,931
Oleo stock	2,682,715	Cottonseed oil, crude	2,509,460
Tallow	1,796,536	Cottonseed oil, refined	1,370,123
Lard	178,090,296	Corn oil	67,720
Lard, neutral	5,153,820	Vegetable oil lard compounds	1,688,531
Lard compounds, containing animal fats	872,242	Other edible vegetable oils and fats	872,422
Oleo & lard Stearin	1,086,000	Coconut oil	8,394,748
Neat's-foot oil	379,516	Linseed oil	510,637
Other animal oils, inedible	160,146	Soya-bean oil	1,804,736
Fish oils	326,023	Vegetable soap stock	1,392,150
Grease stearin	796,452	Other expressed oils and fats, inedible	2,331,323
Oleic acid, or red oil	957,224	Glycerin	247,895
Stearic acid	348,659		

Recent Activities of Margarine Union

THE report was current in Rotterdam recently that the Margarine Union had taken over the McDonnell of Waterford Margarine Works in Ireland. No additional details were available at that time.

The Gazette of the Netherlands Government, under date of September 2, 1929, published the statutes of a new subsidiary of the Union, the name of which in English is "Margarine Sales Central Limited." The purpose of the Company is stated to be wholesale and retail trade in margarine, butter and other milk products, edible fats and oils for its own account as well as for the account of third parties. A feature of the working organization of this new company is that the service of salesmen will be dispensed with in each of the eleven provinces of the Netherlands, and that merchants will be required to send in their orders to the district sales offices of the company, one of which is to be established in each province. This is a new departure in merchandising and it will be of interest to note how it may work out.

An agreement has been entered into between the Margarine Union and Wessanen's Royal Factories at Wormerveer, Netherlands, which stipulates that the latter will cease to manufacture margarine. The firm in question is one of the few remaining independent margarine churners. In order to effect economies in production, three large Danish Margarine factories, the "Bona," "Steensen" and the "Jysk Margarine Fabriker," will be consolidated into a new concern affiliated with the Margarine Union, to be known as United Margarine Factories, with production centralized at the plant of Steensen at Sonderburg.

Exports of Fish Oils from Norway

THE following table shows exports of fish oils from Norway, during the period January 1 to September 30, 1929:

	Barrels
Medicinal cod liver oil	87,814
Industrial cod liver oil	43,050
Hardened whale oil	58,100
Whale oil	33,154
Seal oil	33,154
Herring oil	95,338

The total quantity of copra exported from French Oceania during the quarter ended September 30, 1929, was 4,407,164 pounds, valued at $143,240, as compared with 5,761,938 pounds, valued at $264,819 exported during the corresponding quarter of 1928. The table shows a substantial decrease of 1,354,774 pounds in the quantity and $121,579 in the value. It is reported in trade circles in French Oceania that the low prices received for copra are due to the competition of cottonseed oil. It is stated that there has been an enormous production of cottonseed oil in the United States during the year of 1928, and that as a consequence, cottonseed oil has been substituted in many articles of commerce for coconut oil and has thus affected adversely the price of copra.

Notes of the Industry

Capital City in Hard Butters

CAPITAL City Products Co., Columbus, O., announce the establishment of their Coconut Oil Specialties Division for the manufacture and sales of plastic and hard coconut butters under the brand name of Pu-re-co. Additions have been made to the refinery buildings at the local plant and special machinery will enable them to take care of the production anticipated in this new department.

Charles Mongere, formerly of the Glidden Food Products Company, has been appointed manager of sales and research. Mr. Mongere has had 27 years experience in the coconut butter field and among the candy and biscuit manufacturers is considered an authority on the uses and manufacture of their products. The sales and service department will include W. G. Armitage and H. C. Burr. Mr. Armitage pioneered the coconut butter products for the Palmolive Company and has experience with this type of product dating back as far as 1910. Mr. Burr is formerly of the Glidden Food Products Company for eight and one-half years and has had twelve years experience with the candy trade. Distribution of this product will also be made through brokers in the leading cities as well as the company's branches, Chicago, Toledo, Pittsburgh, Philadelphia and Syracuse.

Margarine Union Stock Increase

A SPECIAL meeting of stockholders of Margarine Union, Ltd., will be held in London on December 10 to vote on a proposed increase in the authorized share capital of the company from £4,100,000 to £11,600,000 by the creation of 1,000,000 7 per cent cumulative preferred shares of £1 each and of 6,500,000 ordinary shares of £1 each.

It will be remembered that an announcement was issued in September that a provisional agreement had been signed providing that the ordinary share capital of Lever Brothers, Ltd., and the share capital of Margarine Union, Ltd., with which was associated N. V. Margarine Unie, should be amalgamated as from January 1, 1930. The principal object of the creation of the additional share capital now proposed is to enable Margarine Union, Ltd., to carry out its part of this agreement, which will not involve any issue to the public, while a reasonable margin of unissued capital will remain available for use in the future. A general meeting of shareholders of N. V. Margarine Unie has been called for the same date.

Pneumatic Copra Handling

THE Southern Railway System is installing a Holly Pneumatic Conveyor at its New Orleans Terminal for the handling of bulk materials, particularly copra, from ships to box cars. The copra or other bulk material to be unloaded will be picked up by suction in the hold of steamer or schooner, conveyed to the box car and properly trimmed in the car in one operation. Elimination of labor, plus speed and simplicity will produce substantial savings in the time and cost of the unloading operations, according to officials of the railway system.

British Aid for Tung Oil

IN approving a grant to the Royal Botanic Gardens at Kew, London, for the distribution of Chinese tung nuts to various parts of the British Empire, the Empire Marketing Board is encouraging the production of tung oil as a new Empire industry. This oil, which is an essential constituent of certain kinds of varnish, was much used during the war in special water-resistant varnishes which were needed for air plane work.

The expenditures approved by the board are to be divided as follows:—A sum not exceeding £700 is to go to the Royal Botanic Gardens, Kew, for the distribution of further supplies of seed during the year, for the purchase and sale of seeds to meet large orders received from foreign companies and planters, and for the purchase of commercial samples of fruit for subsequent treatment by pressing and extracting; £750 a year for five years is to go to the research association of British Paint, Color & Varnish Manufacturers to provide for the appointment of a special worker to investigate the chemical and technical properties of tung oil; and £100 is to be used for experiments on the feeding value of the oil cake.

China has supplied the greater part of the world's wants until recently, but as that country is believed unlikely to be able to cope with the increasing demand, further measures are considered necessary. The trials already made with seeds in a number of British dominions are regarded as promising.

Margarine Consumption

(*from p.* 13)

"Finally, with the increase in consumption of fresh fruits and vegetables in the form of salads throughout the year, goes an increased use of salad oil. This is in part olive oil, but largely carefully refined deodorized and decolorized cottonseed oil. Salad oil may be consumed as such, but a large part of the consumption is in the form of prepared mayonnaise and other dressings, and their manufacture has become a considerable industry. Altogether, the increased use of vegetable oils has contributed to diversification of the diet, to convenience in the kitchen and to some actual and more potential cheapening of the food fats as a whole. It has come about largely as a result of improved technology, supplemented by vast commercial advertising. Provided the nutritive deficiencies of vegetable oils are made up by other components in the diet, as is ordinarily the case, there are no offsetting dietary disadvantages."

Virgin Olive Oil

(*from p.* 19)

forwarded to the Bureau of Standards had a fluorescence similar to that of a second pressing European olive oil obtained in very much the same manner. Moreover, although it was suggested at that time that one difficulty might be that California oils appeared differently fluorescent than European olive oils, we have obtained authentic samples of California olive oils which do appear identical with European oils. These California oils, in order to appear as "Virgin" under the lamp, must be taken from the first of the four expressions, or, if a machine is used similar in type to the Anderson expeller, the oil must be taken from the first part of the machine, and must have been cold-pressed.

Another objection raised more recently is to the effect that chlorophyll or other coloring constituents may be added to a refined olive oil to produce a "Virgin" oil type of fluorescence. We have obtained samples of five different chlorophylls, including those used by the Italian investigator who raised this question; but find that the blue fluorescence of a refined oil may not be covered by the deep green coloration of chlorophyll—no matter in how great quantities it has been added. We want to confirm our earlier reports that it is apparent the blue fluorescence of a refined oil is due to a destruction of the chlorophylls present rather than to oxidation, and that the only connection between the two phenonema occurs when, during the process of the development of rancidity, part of the coloring matter has been destroyed or changed — as indicated by the difference in fluorescence. Although it has been found in our laboratory that by the addition of a small quantity of annatto in oil to a refined olive oil there may be produced a fluorescence similar to that of "Virgin" olive oil, the usual chemical test for annatto is sufficient to detect the presence of this adulterant.

Kellogg & Sons Earnings

THE annual report of Spencer Kellogg & Sons, Inc., flaxseed oil, Buffalo, for the fiscal year ending September 28, shows net profits of $1,297,730, or $2.55 a common share, after depreciation, interest, and Federal taxes. The net profit in the preceding fiscal year equalled $3.59 a share. The decrease in the company's earnings is attributed largely to larger expenses of a non-repeating nature. The outlook for the present fiscal year is reported to be more optimistic. James L. Wickstead, treasurer of the company has been elected a director.

Alan Porter Lee

Engineer

Equipment and Processes for
Fatty Oils and Soap.

Pressing - Extraction
Refining - Bleaching
Deodorizing

Design - - Operation
Construction

136 LIBERTY STREET
NEW YORK, U. S. A.

ABSTRACTS

David Wesson, *Abstract Editor*

Theories of Oil Drying

IN A study and discussion of recent theories of the drying of oils the conclusion has been reached that oxidation is followed by polymerization and gelation. Pure beta-eleostearin was oxidized in the solid state and in solution in benzol and in carbon tetrachloride. The results of oxidation in the solid state were not satisfactory. Oxidation in solution resulted in an insoluble gel and a soluble portion. The insoluble gel is a monoperoxydihydroxy-beta-eleostearic glyceride, while the soluble form contains two constitutents, one of which is insoluble in petroleum ether and the other soluble in that medium. In the latter component the hydroxyl groups of the insoluble gel have passed into the keto form and the peroxy group has disappeared. The insoluble gel yields a polymerized methyl ester, insoluble in petroleum ether, and a simple methoxy methyl ester, soluble in petroleum ether. The soluble portion yields corresponding products. *J. Oil & Colour Chem. Assoc.* 12, 183-205 (1929).

The thiocyanogen numbers of thirty-two different animal and vegetable oils have been determined by a Japanese research worker and the differences between this number and the iodine value discussed. The selective action of free thiocyanogen on unsaturated fatty acids was also studied. One molecule of thiocyanogen is taken up by oleic elaidic and linoleic acids while linolenic acid takes up between one and two molecules. This suggests the existence of isomers which have different thiocyanogen numbers. *J. Soc. Ind. Japan* 32, 451-61 (1929); *Supplementary Binding,* 32,138-41B (1929).

Decrease in the volume of fatty oils on drying is said to be due to the coagulation of the colloidal solution of the oxidation products of the glycerides of the fatty acids. Oxidation and coagulation processes are of the autocatalytic nature. Physical properties of the oily film are greatly affected by the presence of foreign substances such as driers. *Maslob. Zhirov. Delo* 1928, No. 10, 35-41; No. 11, 28-32; No. 12, 26-32.

When cod-liver oil was subjected to the action of a silent electric discharge in an atmosphere of hydrogen under normal pressure, the oil was said to be perfectly deodorized after one and one-half to three hours treatment, the applied electric pressure being between 1000 and 2000 volts. It is claimed that Vitamin A was not destroyed by the process and that the oil retained its original nutritive value. *J. Soc. Chem. Ind. Japan* 32, 308-12 (1929) Supplemental Binding, 32 93-4B (1929).

It has been demonstrated by the example of linseed oil and its iodine number, which varies with the climate in which the seed is raised, that creation of international standards for vegetable oils is not possible in all cases. The oils of tropical plants, which contain mainly saturated fatty acids and fatty acids with one double bond, possess uniform properties on account of their formation in a uniform climate. The properties of oils containing 2 or 3 double bonds, however, depend upon the location in which these oils originated. *Vestnik Stand.* 1928, No. 3, 20-2; *Chem. Zentr.* 1928, II, 2417.

Organic compounds may be dehydrogenated by passing their vapors at elevated temperatures over a catalyst comprising a compound of a metal with a metalloid alone selected from the fifth or sixth group of the periodic system, having an atomic weight between 31 and 209. Such catalysts are the phosphides, antimonides, arsenides, bismuthides, sulfides, selenides and tellurides of zinc, cadmium, nickel, cobalt, iron, aluminum, calcium, magnesium, etc. For example, a 20% yield of para-cymene is obtained when turpentine is passed over massive zinc phosphide at 600°. The yield of para-cymene is increased to 60% if the turpentine is passed over zinc sulfide precipitated on pumice stone at 540°. U. S. Pat. No. 1,684,634.

Emulsions formed in refining castor oil with caustic soda solution may be avoided by diluting the oil with benzene, which is later distilled off from the refined oil. *Maslob. Zhirov. Delo* 1928, No. 7, 12-4.

Prices

Candles, adamantine 6s 16 oz.			
20-set cases	set.	.14½	.15¾
40-set cases	set.	.14	.14½
Candles, paraffin, cs., 14 oz., case of 40 sets	set.	.10	.10¼
6s 14 oz., case of six cartons containing 36 sets	set.	.11	.11¼
6s 12 oz., 40 set cases	set.	.09	.09¼
6s 12 oz. cases of six cartons containing 36 sets	set.	.10	.10¼
Patent ends	set.	.17¾	.18
Stearin 6s 16 oz., plain, cases	set.	.16¾	.17
Castor, No. 1, bbls.	lb.	.13¼	.13½
No. 3, bbls.	lb.	.12¾	.13
Chinawood, bbls. or drs.	lb.	.14½	.14¾
Coast, tanks, spot	lb.	.12¾	.13
Futures	lb.	.12½	.12¾
Coconut, Ceylon grade, bbls.	lb.	.08⅛	.08¼
Coast, Tanks	lb.	.06⅝	.06¾
Cochin grade, bbls.	lb.	.08¾	.09
Manila, bbls.	lb.	.08¼	—
Tanks, N. Y.	lb.	.07	.07⅛
Coast, tanks	lb.	.06¾	.06⅞
Fatty acids, mill, tanks	lb.	—	.10½
Cod, Newfoundland, bbls.	gal.	.59	.60
Copra, bags, coast	lb.	.04⅜	—
Corn, tanks, mills	lb.	.08	—
Bbls., New York	lb.	.10	—
Refined, bbls.	lb.	.11	—
Fatty acid	lb.	.08¾	—
Cottonseed, crude, tanks, mill	lb.	.07¼	.07½
P. S. Y.	lb.	.08¾	.09¼
Fatty acids, mill, bbls.	lb.	.09	—
Degras, domestic, bbls.	lb.	.04¼	.05½
English, bbls.	lb.	.04½	.05
German, bbls.	lb.	.03½	.04
Neutral, domestic, bbls.	lb.	.07¾	.09½
English, bbls.	lb.	.08	.09
German, bbls.	lb.	.07	.07½
Greases, choice white, bbl. N. Y.	lb.	.08	.09
Yellow	lb.	.06½	.06⅝
Brown	lb.	.06⅜	.06½
House	lb.	.06½	.06⅝
Bone Naptha	lb.	.06¼	—
Herring, coast tanks	gal.	—	—
Horse, bbls.	lb.	.09½	—
Lard, city, tierces	lb.	.10½	—
Compound, tierces	lb.	.10¾	.11
Middle Western, tierces	lb.	.11	—
Neutral, tierces	lb.	.12¾	—
Prime Western, tierces	lb.	.11	—
Lard oil, No. 1, bbls.	lb.	.11¾	—
No. 2, bbls.	lb.	.11½	—
Extra bbls.	lb.	.12½	—
No. 1, bbls.	lb.	.12	—
Winter strained, bbls.	lb.	.12¾	—
Prime, bbls.	lb.	.15	—
Linseed Oil, boiled, tanks	lb.	.1440	—
Car lots, bbls.	lb.	.1520	—
Less car lots, bbls.	lb.	.1560	—
Less than 5 bbls.	lb.	.1600	—
Double boiled, less than 5 bbls.	lb.	.1630	.1660
Raw, tanks	lb.	.1400	—
Car lots, bbls.	lb.	.1480	—
Less car lots, bbls.	lb.	.1520	—
Less than 5 bbls.	lb.	.1560	—
Refined, bbls.	lb.	.1550	.1590
Varnish grades, bbls.	lb.	.1570	.1610
Linseed cake, bags	ton	45.00	—
Meal, bags	ton	55.00	—
Menhaden, crude, tanks, Baltimore	gal.	.45	nom.
Light pressed, bbls.	gal.	.67	.70
Yellow bleached, bbls.	gal.	.69	.72
White bleached, bbls.	gal.	.72	.75
Mustard, bbls.	gal.	.85	.90
Neatsfoot, cold pressed, bbls.	lb.	.18½	—
Extra, bbls.	lb.	.12½	—
No. 1, bbls.	lb.	.12	—
Pure, bbls.	lb.	.14½	—
Oleo, No. 1, bbls.	lb.	.11¼	—
No. 2, bbls.	lb.	.10¼	—
No. 3, bbls.	lb.	.10	—
Olive, denatured, bbls. N. Y.	gal.	.92	.95
Shipments	gal.	.90	—
Foots, bbls.	lb.	.08	.08¼
Shipments	lb.	.07⅞	—
Edible, bbls.	lb.	2.00	2.30
Palm, Lagos, casks, spot	lb.	.07½	—
Shipments	lb.	.07⅜	—
Niger, casks, spot	lb.	.07	—
Shipments	lb.	.06⅞	—
Palm Kernel, pkgs.	lb.	.08¼	.08½
Tank cars	lb.	.07¾	—
Peanut, crude, bbls.	lb.	.11½	nom.
Mills, tanks	lb.	.08½	nom.
Refined, bbls.	lb.	.13¼	nom.
Perilla, bbls.	lb.	.17	nom.
Poppy Seed, bbls.	gal.	1.70	—
Rapeseed, blown, bbls.	gal.	1.00	1.02
Refined, bbls.	lb.	.73	.74
Red Oil, distilled, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Saponified, bbls.	lb.	.10⅝	.11⅛
Tanks	lb.	.09¾	—
Salmon, coast, tanks	gal.	.44	nom.
Sardine, coast, tanks	gal.	.48	nom.
Sesame, refined, drums	lb.	.12½	.14
Soya Bean, blown, bbls.	lb.	.13½	.13⅝
Crude, bbls.	lb.	.12½	.12⅝
Orient, coast, tanks	lb.	.10½	.10⅝
Sperm, bleached f.o.b., New Bedford, bbls.	gal.	.84	.85
Natural, f.o.b., New Bedford, bbls.	gal.	.78	.80
Stearic Acid, Double pressed, bags	lb.	.15¾	.16⅛
Triple pressed, bags	lb.	.18¼	.18⅝
Stearine oleo, bbls.	lb.	.09¾	.10
Tallow, edible, bbls.	lb.	.08¾	.08⅞
City, extra, works, loose	lb.	.07⅞	—
Special, works, loose	lb.	.07⅝	—
Tallow oil, acidless, bbls.	lb.	.11	—
Tanks, N. Y.	lb.	.10¾	—
Vegetable tallow, coast, mats	lb.	.07¾	—
Whale, crude, No. 1, coast, tanks	lb.	.07	—
No. 2, coast, tanks	lb.	.06½	—
Refined, winter bleached, bbls.	gal.	.80	—
Extra, bbls.	gal.	.82	—
Natural, bbls.	gal.	.78	—

Market Report on

FATS, OILS AND GREASES

(*As of November 25, 1929*)

NEW YORK—Prices of oils, fats and greases continued to show a distinct downward trend throughout the recent period. Only a few scattered items resisted the general decline, and the advances in these few cases were only fractional. The greater part of the list moved downward, with substantial price reductions taking place in a number of products. The various commodity markets were still in a weakened condition as a result of the recent collapse in the securities markets. Nevertheless, the opinion prevailed that general business conditions would not be seriously disturbed by the break. This resulted in a show of greater strength in the market for oils and fats toward the close of the period. Trading in cottonseed oil was light, with considerable uncertainty resulting from the stock break. Prices were lower also for lard, tallow and grease. Corn oil, lard oil, olive oil, palm oil, linseed oil and chinawood oil were all quoted lower. Coconut oil was priced slightly higher as were neatsfoot and soya bean oil.

Chinawood Oil

In spite of the fact that supplies of this oil, both here and abroad, are said to be small, another reduction was noted in quotations. Coast tanks were priced at 12¾c to 13c lb., a reduction of 1¾c lb. from the closing price of last period.

Coconut Oil

There was a fractional advance in the price of this oil during the period, which stood out because of the general weakened condition of most other oils. Buyers showed no tendency to purchase in advance of requirements, and sales at the quoted prices were small.

Corn Oil

Corn oil continued its recent downward course, dropping ½c lb. on all varieties. Demand was not important, and there were few offerings at the reduced quotations.

Cottonseed Oil

The cottonseed oil market was quiet, as uncertainty kept traders from buying until they secured additional information on the situation. P. S. Y. oil was priced at 8¾c to 9¼c lb., about the same range as at the close of last period, but crude oil was ¼c to ⅜c lb. lower, closing at 7¼c to 7½c lb. in tanks.

Grease

The grease price list was down considerably from last month's close, house and yellow grease being priced at 6½c lb., inside, almost 1c lb. under the previous quotation. The rest of the list was correspondingly low, in spite of fair demand for the product.

Lard

All grades of lard were quoted lower at the close of the recent period, the declines ranging from ½c to 1½c lb. City tierces sold at 10½c lb., with the compound at 10¾c to 11c. The market was quiet, with purchasers showing no willingness to buy ahead.

Linseed Oil

The sharpest cut in prices in the whole list of oils occurred in linseed oil, which dropped from .1550 to .1400 for raw oil in tanks. All other items on the list also declined 1½c lb. This was a continuation of the decline noted last month, which came as a result of the collapse in the stock markets. The decline was finally checked toward the close, and both flaxseed and linseed oil ended the period in stronger position.

Olive Oil

Quotations on olive oil and foots were reduced, denatured oil closing the period at 92c gal. inside, with foots at 8c to 8¼c lb. Demand for each was routine.

Palm Oil

Palm oil prices were again reduced fractionally to agree with quotations on competing product. Firmer reports from abroad caused a strengthening of the domestic situation.

Stearic Acid

An advance of ¼c lb. occurred during the period, in both double and triple pressed stearic acid, the former closing the period at 15¾c lb., inside, with the latter at 18¼c lb. inside.

Tallow

A quiet market prevailed for tallow, with consequent reductions in prices to attract interest. Edible tallow was offered at 8¾c lb., with city extra at 7⅞c.